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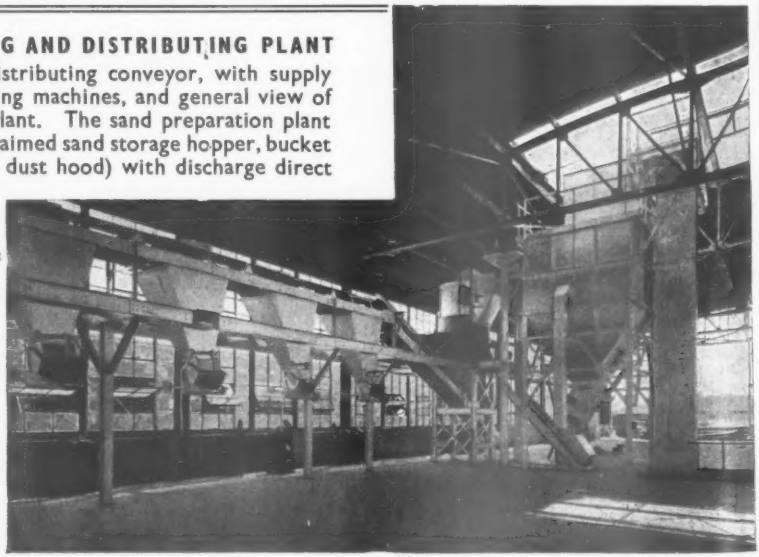

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A Preliminary Survey

It becomes increasingly important for founders to keep themselves up to date on European matters, for this market is a most important one. British prestige has suffered somewhat in the recent past, but has recovered much since the Government took steps to strengthen the position of sterling. Only last week in Milan, we saw one bank displaying in its window a graph showing its recent increases in sterling balances. The European foundry industry much admires our successes in the reduction of industrial accidents. Nowadays, we lead the world with the low figure of 0.05 per 1,000 man/years (in 1957). This figure compares with 0.09 in the USA (1957), 0.23 in Sweden (1954), 0.25 in West Germany (1956) and 0.44 in Austria (1956). A second aspect which meets the approbation of Continentals is our rapid production of statistics. On the other hand, they have no great opinion of our method of organizing our employers' federations, because they are not interlocked.

Two weeks ago, we dealt with the first reaction of the Belgians to the operation of the Rome Treaty. Now there is announced a rift in the European Coal and Steel Community, as Belgium, Holland and Luxembourg submitted a plan to the Council of Ministers of the Community sitting in Strasbourg which was rejected. It was all about excess coal production and in support of the rejection the German Secretary of State argued that the only problem was that of the German mines.

The creation of the *Haute Communité* and the Rome Treaty was effected when there was a sellers' market and everybody knows how easy it is to operate successfully an employers' association under these conditions. It is when trade slackens off that difficulties arise. We suggest the same thing will happen in international co-operative organizations under parallel conditions. The only difference is that the first concerns individual firms and the second nations. All this is very important when negotiating for a European Free Trade Area, for, whilst the overall tariff arrangements can be stabilized, countries—just like individual firms in the case of Association rules—can find subterfuges for overcoming them. Perhaps it is just as well that there has been a delay in British participation in European tariff arrangements, as the interval will enable information to be gained as to favourable and adverse impacts which result from the Continental set-up.

Lloyd's "Open House"

Large Attendances at Wednesbury Works

On May 8 and 9, F. H. Lloyd & Company, Limited (steelfounders and engineers), opened their extensive works at Wednesbury for visits by representatives of customer firms, suppliers and other friends. Approximately 300 attended on each day and were given every facility to tour the works and inspect processes in operation in the shops. Initially, in the morning, conducted tours were made of an imposing and comprehensive exhibition of castings, fully-machined components and certain end-products made by the firm which were housed in a section of one of the large machine-shops. Here, a great variety of materials in cast form were on view, including a complete range of carbon and alloy steels, the company's Thermalloy products, alloy centrifugal castings, s.-g. iron castings (including crankshafts), and a whole range of large and small machined and semi-machined items. Featured in the exhibition also were sections devoted to some of the productions of F. H. Lloyd's associate companies, namely, Parker Foundry (1929), Limited, of Derby, and Lloyd's (Burton), Limited. Valuable support was given to the exhibition by the showing of complete machines in which Lloyd's castings were incorporated. After seeing the exhibition, the company was entertained to luncheon in a large marquee which, it was interesting to learn, was erected on the site of a new heavy foundry shortly to be built. At the conclusion of the lunch a vote of thanks to the firm and its directors was proposed (on the day on which the writer attended) by Mr. K. F. Massey of B. & S. Massey, Limited, who amongst his remarks stated that, on quality and selling price, British steelfounders "have the edge on" their major world competitors—United States and Germany.

In the afternoon, tours of the works were undertaken by the guests, split up into small parties under the guidance of senior executives of the firm. The writer was particularly interested in viewing the new and splendidly-equipped patternshop, pattern stores and repetition-foundry melting shop. The firm's machine-shops are at present being extended. In the radiographic bay, housed in a special building somewhat remote from other shops on the site, it was interesting to inspect the set-up for gamma-ray inspection of castings using a 20-Curie Cobalt 60 source. Also in this department, the supersonic scanning of castings is being carried out on a production basis.

At the conclusion of the visits, the parties reassembled for tea before departure.

Plessey International forms German Company

Formation of a German company to further Plessey interests in the European market is announced by Plessey International, Limited, Ilford (Essex). Registered as Plessey Maschinen Elemente Gesellschaft, GmbH, with a nominal capital of DM200,000, the new company will be responsible for the manufacture of many products in the light engineering field, particularly those relating to hydraulic equipment. It will be situated at Neuss, near Düsseldorf.

The directors are Mr. B. G. W. Attwood, Mr. T. White Wilson, Mr. P. W. Faulkner, Mr. D. G. Booth, and Mr. R. Sellies (Geschaftsfuhrer).

Institution of Metallurgists

Annual General Meeting and Luncheon

At the fifteenth annual general meeting of the Institution of Metallurgists held on May 12 at the Park Lane Hotel, London, Professor A. J. Murphy, M.SC., F.I.M., F.R.AE.S., principal of the College of Aeronautics, Cranfield, and a past-president of the London branch of the Institute of British Foundrymen, was chosen as president. The following were also elected to office: As president-elect: Mr. W. E. Bardgett, B.SC., A.M.I.MECH.E., F.I.M. (of United Steel Companies, Limited); vice-presidents: Dr. W. O. Alexander, B.SC., F.I.M. (of Imperial Chemical Industries, Limited, Metals Division), and Professor J. W. Cuthbertson, D.SC., A.M.I.E.E., F.I.M. (University of Nottingham); hon. treasurer: Dr. E. G. West, B.SC., F.I.M. (Aluminium Development Association) (re-elected); ordinary member of Council elected by fellows: Mr. L. Rotherham, M.SC., F.INST.P., F.I.M. (Central Electricity Generating Board); ordinary members of Council elected by associates: Dr. C. S. Ball, B.MET., A.I.M. (Steel Company of Wales, Limited); Mr. D. Lewis, B.SC., A.I.M. (Ministry of Supply), and Dr. I. G. Slater, M.SC., F.I.M. (College of Technology, Birmingham).

Luncheon Speakers

Professor A. J. Murphy presided over the luncheon, at which the principal speakers were Sir Harold Roxbee Cox (director of Wilmot Breeden (Holdings), Limited, the Metal Box Company, Boulton Paul Aircraft, Limited, member of Council, Air Registration Board, and member of Council for Scientific and Industrial Research, vice-chairman of the National Council for Technological Awards, a governor of the College of Aeronautics), and Vice-Admiral Sir Frank Mason, K.C.B. (director of Metal Industries, Limited, H. W. Kearns & Company, Limited, chairman, the Mechanical Engineering Research Board, Department of Scientific and Industrial Research, and Engineer-in-Chief of the Fleet from 1953/7).

British Steel for Belgian Market

With the object of bringing the Belgian market within reach of British producing concerns for which it places export contracts, the British Iron & Steel Corporation, Limited, has appointed an agent for the Belgian market—Chimie et Metallurgie SA, Brussels.

The company has for some time been agent for a number of British firms, including the Delta Metal Company, Limited, and the Steel Company of Wales, Limited, and also for makers of marine engineering equipment, including Sigmund Pumps, Limited, Donkin & Company, Limited, and J. Stone & Company (Deptford), Limited.

The announcement regarding the agency was the outstanding event of the British Day at the Brussels International Trade Fair. There are 319 British concerns exhibiting.

A spokesman for the agent company said that there is at present a brisk business in Belgium for steel shapes and other materials for shipbuilding. Despite the Common Market in steel products, British goods in this class—particularly in open-hearth steel—are able to meet German competition.

Foundry Goggles

Second Report of the Joint Advisory Sub-committee*

(Slightly Abridged)

This second report on foundry goggles deals mainly with the application of plastics as protective materials. The findings of the first report are summarized first, and then experimental work on possible types of projectile is dealt with. An impact-testing rig, incorporating an air rifle, is described and illustrated in detail. Also illustrated is equipment designed by the Sub-Committee to test the resistance of plastic lenses to heat from embedded hot-solid particles.

Introduction

In his letter to Mr. T. W. McCullogh, O.B.E., H.M. Chief Inspector of Factories, Mr. R. Bramley-Harker, the chairman of the Joint Advisory Committee on Foundry Goggles, presented their Report. He stated that the Technical Sub-Committee had: designed, constructed and used a new type of test rig; concluded a series of tests; found certain materials which withstand testing, and confirmed and amplified their earlier conclusions. Preliminary work had also been done on certain ophthalmological aspects of the selected materials by Mr. Weston, and there was good reason to believe that the materials will satisfy the British Standard requirements in this respect.

Mr. Bramley-Harker went on to say that, the Technical Sub-Committee had been asked to proceed now with the third phase of their work, and that this was in fact already in progress. This work involves the design and construction of another test rig on which complete goggles, spectacles or face screens can be tested, so that the performance of the actual articles as worn can be judged.

Mr. Bramley-Harker continued by acknowledging that the Chief Inspector of Factories had arranged for the First Report to be published in full in the FOUNDRY TRADE JOURNAL, and said the committee had noted this with satisfaction. There is now every reason for the makers and users of all forms of eye protection, for use in foundries in particular and in industry generally, to be aware of the findings of the Sub-Committee, and for makers to proceed at once with such research and development in co-operation with this Committee as will ensure early commercial production of eye protection on the basis of the information now available. Mr. Bramley-Harker concluded his letter by expressing thanks to the Technical Sub-committee for the work which had been done. The members of the Sub-committee were Mr. A. W. Bushell and Mr. W. B. Lawrie, M.B.E.

Conclusions from First Report

The Sub-committee has now reached the end of the second stage of the work that was remitted to it by the Joint Advisory Committee on Foundry Goggles. This second report deals chiefly with the strength of the plastic materials of which lenses may be made, although some very preliminary work on full goggles has been done. Construction aspects of goggles and spectacles are also being considered. This report does not deal with ophthalmological aspects of the problem, even though early work is already in hand. For convenience, the conclusions reached at the end of the first phase of the work (which were embodied in section 36 of the first report) are given at this stage:

(*a*) Toughened glass should not be used as protection against molten metal, nor should it be used to protect against flying particles in foundries.

(*b*) Laminated glass is always broken by the molten metal, and often broken by flying particles. In some cases splinters fly off from the surface of the laminated glass that would be adjacent to the wearer's eyes. It could not be said that laminated glass is useless, but those who have seen the experimental work would not be comfortable in using this material. It is thought, therefore, that laminated glass should not be used in foundries.

(*c*) Plastics are greatly superior to glass in resisting penetration by molten metal. Much more work needs to be done in order to determine the suitability of the various plastics for use as goggles, but there can be no doubt that suitably-designed plastic goggles are infinitely better than glass goggles for resisting penetration by molten metal or flying fragments.

(*d*) The tests available show that a laminated plastic goggle is by far the best so far as physical protection is concerned. Many more aspects of the matter will have to be considered and much more work will have to be done, but the experimental work to date indicates quite clearly that the laminated plastic goggle is the one that provides the maximum degree of safety.

(*e*) Molten metal does not appear to wet plastic surfaces, but it does wet metal and glass surfaces, and adheres to them. It appears at this stage, therefore, that plastic lenses should not be mounted in metal rims, because molten splashes will adhere to the rim and possibly set fire to the plastic. This aspect of

* The first report of the committee is contained in the March 6, March 20 and April 3, 1958 issues of the JOURNAL.

the matter clearly needs further consideration and experimental work.

The above conclusions were quite definite, and have remained unaffected by subsequent work. However, they have been amplified in certain respects to obtain more information about the particular range of protection desirable in foundries.

Conclusions (*a*) and (*b*) were considered to be definite and final, because at the time of the first report the sub-committee had already discarded glass, as a protective material, in any foundry work where eye protection needed to be adequate to withstand molten splashes and hot and cold solid particles at high impact values. However, toughened and laminated glass specimens have been tested in the new test rig, and as expected, failed utterly, the lenses shattering and disintegrating completely as they were penetrated by the projectiles. Conclusion (*e*) concerns the construction of goggle or spectacle frames and this matter has not yet been investigated in detail. This second report, therefore, deals mainly with conclusions (*c*) and (*d*).

PRELIMINARY CONSIDERATIONS

General

The first report was drafted when the sub-committee had:—

(*a*) designed, constructed, calibrated and used a spring-loaded test machine, with cold-solid projectiles, hot-solid projectiles and molten-metal projectiles striking the lenses under test at velocities of 7 to 10 ft. per sec.

(*b*) examined the work of Major Reid, who had designed, constructed, calibrated and used a rig, with cold-solid projectiles striking the lenses under test at velocities of 700 to 900 ft. per sec.

(*c*) designed, constructed, calibrated and used a needle test machine.

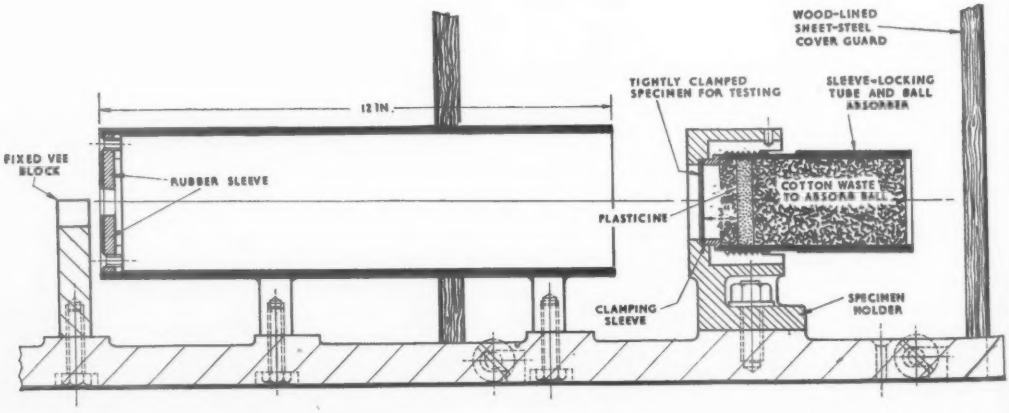
(*d*) completed preliminary burning tests on certain plastic specimens.

The sub-committee had, so far as impact testing was concerned, also expressed the view that a test machine should be designed and constructed that would allow of all specimens to be penetrated, so that the various specimens could be arranged in order of merit. It is still thought that this would be the ideal method, although such a machine has not yet been devised. In fact, the work done indicates that the range of protection available with plastic materials may be so great that it will be no easy matter to devise a single impact testing machine capable of projecting a missile at the necessary speeds.

It had also been decided, for practical reasons, to search for a protection against the high-velocity particles that may be projected across a foundry. Cut-off wheels run at peripheral velocities up to 20,000 ft. per min., and if they break the fragments leave the wheel at this initial velocity. No valid reason for changing the original decision has been found and, although no suggestions are made as to whether or not 20,000 ft. per min. is either a common velocity or a maximum velocity, it is thought reasonable to use this figure as a known actual velocity against which eye protection should suffice.

This second phase of the work was begun, therefore, with information covering cold-solid, hot-solid and molten projectiles at velocities between 7 and 10 ft. per sec., and cold-solid projectiles at speeds between 700 and 900 ft. per sec. Ideally, tests were needed which would indicate the behaviour of goggle lenses at all intermediate speeds, but specifically it was desirable to know what happened at about 20,000 ft. per min. (about 350 ft. per sec.). This meant that the first problem to be solved was the design of a suitable test-

FIG. 1.—*Section view of the test rig for plastic lenses, showing (left) the rifle-muzzle locating cylinder, and (right) the specimen holder.*



machine, because neither the spring-operated machine so far used for low-velocity tests, nor the rig used by Major Reid for the high-velocity tests, could be modified to give the necessary speed range.

Molten-metal Tests

The results of work with molten-metal projectiles had shown that glass always cracked on impact, but that plastic materials were frequently undamaged. It was evident that the effects of heat and impact on the specimen could be separated. However light the blow, glass cracked, because the molten metal adhered to the specimen and rapid expansion following the heat transfer from projectile to specimen. Plastic specimens, however, were never damaged by the heat of the projectile. This appeared to be due to the fact that the molten metals used did not adhere to the plastic specimens but splashed away from them, so that the molten projectiles were in contact with the plastic specimens for so short a time that insufficient heat was transferred from projectile to specimen to damage the latter. Clearly, heat transfer is a function of the time during which projectile and specimen are in contact. This time, in the case of glass lenses, is the same as the time taken for the projectile to cool, because the molten-metal projectiles adhere to the glass. With plastics, however, where the molten projectile splashes away from the specimen, the time is very short. This time is also a function of the speed at which the specimen is struck by the projectile. So long as the specimen withstands the blow, the faster the molten projectile strikes the faster it will rebound. So that when molten projectiles strike plastic lenses, the heat transferred from projectile to specimen varies inversely with the projectile velocity. This means that, so far as the effects of heat are concerned, a high-speed molten projectile does less damage to a plastic specimen than a low-speed molten projectile, or in other words, the most severe effects result from the lowest projectile speeds. The sub-committee had already completed molten-metal tests (on the spring-operated machine) at speeds between 7 and 10 ft. per sec., and as these low-speed tests represented more severe conditions than higher speeds would give, it was decided to do no more molten-metal tests. Obviously, when plastics withstood the heat in the more severe conditions, there was no point in testing them again under less severe conditions.

Hot-metal Tests

The above argument holds for molten-metal projectiles, and for hot solid projectiles, so long as the latter bounce from the specimen. In either case, the faster the initial impact the shorter the time of contact and the smaller the amount of heat transferred to the specimen. This is not true, however, of hot solid projectiles which embed themselves in the plastic lens when the impact has been insufficient to break the lens. In this case heat will be transferred to the lens, which will be damaged (that is, in addition to the damage already produced by the impact of the projectile). It is obviously a matter of some importance that a lens with a red-hot projectile embedded in it should neither take fire, nor melt in so short a time that the wearer is unable to remove the spectacles from his face before suffering injury. It was decided therefore that tests designed to discover the influence of heat on the plastic specimens must be persisted in, and the sub-committee have in consequence continued the relevant series of tests which had been started when the first report was made.

Nature of Projectiles

The foregoing considerations led to the view that impact tests could be done with cold solid projectiles, so long as other tests had provided sufficient information about the effects of heat (as distinct from the effects of impact). Molten-metal tests were therefore discontinued, and the sub-committee proceeded by using solid projectiles.

Needle Tests

It was decided to continue the use of the needle machine described in the first report.

Existing Information

Before proceeding with the design of a suitable machine for testing impact values, manufacturers of plastics were approached in the hope that they might be able to furnish sufficient information to allow of calculation or estimation of the strength of the various materials. Unfortunately this information was not available, and it appeared that it would not be practicable to take results of plain sheet material and extrapolate them to laminated material. It was evident, therefore, that it was necessary to design and construct a machine which would supply the necessary data.

IMPACT TESTING

General

Once it had been decided that cold-solid projectiles could be used to determine impact properties, the possibilities of some kind of test machine which would eject the projectile at all speeds from zero to 1,000 ft. per sec. were examined. Obviously, the construction of such a machine would be no easy matter and so, desirable as it is still thought to be as a matter of pure research, it was decided that a quicker and more practical approach must be used. It had been decided that the known velocity of 20,000 ft. per min. (333.3 ft. per sec.) must be allowed for, which meant in practice that the selected materials had to be capable of withstanding a projectile travelling at a speed of from 330 to 400 ft. per sec.

Major Reid had used a steel cube weighing about 1 gm., so it was decided to use a projectile of the same weight in order to obtain comparable results. It was thought that ¼-in. dia. steel ball-bearings would be convenient projectiles, because they weigh about 1 gm., are easily obtained, and are made to known tolerances of hardness, shape and size. It was also decided that the proposed test rig should be so constructed that both single lenses, and complete goggles or spectacles, could be tested in it.

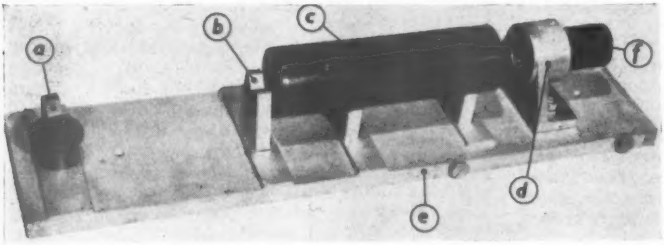


FIG. 2.—*View of the test-rig without the rifle, and with the specimen-holder guard removed.*

KEY: (*a*) Micro-adjustable vee-block; (*b*) fixed vee-block; (*c*) rifle-muzzle locating cylinder; (*d*) specimen holder; (*e*) base plate, and (*f*) sleeve locking-tube.

The testing of single lenses would give information on the impact properties of the materials, and the testing of completed goggles would indicate the final impact values which could be withstood. This represented two distinct phases of work, and the testing of lenses was proceeded with first so as to find suitable material for finished goggles.

Proposed Methods of Testing

Drop Test

Several methods of testing were considered before reaching any final decision. The simplest method would have been a drop test, but it was obvious enough that projectile velocities of the order of 400 ft. per sec. could not have been obtained from any reasonable height, but the possibility of dropping a much heavier projectile from some practicable height was considered. Had this been done, a projectile of an appropriate weight would have been dropped from such a height that it achieved the same momentum as a ¼-in. dia. ball-bearing travelling at a speed of 400 ft. per sec. The effects of impact are, however, determined to an appreciable extent by the time over which the energy of the projectile has to be absorbed. The heavier projectile at slower speeds could not, therefore, be expected to reproduce the effects of the lighter one at much higher speeds.

Compressed Air

The use of a compressed-air-operated mechanism designed to cover the velocity range of zero- to 1,000-ft. per sec. was then contemplated. No such easily-available commercial apparatus, which could be adapted to this purpose, was found and this line of thought was pursued no further once it had been decided that the velocity range of from 350 to 500 ft. per sec. could in any case be explored fairly quickly and easily.

Cartridges

The use of cartridges, with a suitable explosive substance as a propellant, was discussed. The speed range was somewhat low for normal ballistic purposes, but the method was discarded chiefly because of the costly equipment involved (chronometers etc.), and the difficulty of the experimental method (with the consequent necessity for a skilled operator for each test rig). Major Reid had had the services of such a specialist, but the Sub-committee preferred a test which could be easily done by an unskilled operator if necessary.

Mechanical Methods

Two mechanical methods of testing were also examined. The first idea was to drop a weight through a known distance, the weight being suspended from a chain wrapped round the rim of a wheel, so that as the weight fell the wheel rotated. If the wheel were mounted on a shaft which also carried a striker arm, the peripheral velocity of the wheel could be calculated from the height through which the weight fell, and the peripheral velocity of the tip of the striker arm could also be calculated from the ratio of the wheel radius to the length of the arm. If the tip of the striker arm were then to strike a ball-bearing it would be swept away at the speed of the tip itself. This projectile speed could be altered by adjusting the height through which the weight fell and the ratio of the radius of the wheel to the length of the arm, or by providing linkages of varying lengths.

The second mechanical method proposed was to run a fly-wheel, on a hollow shaft, inside a close-fitting case provided with a single ¼-in. dia. opening in the periphery. The fly-wheel would be drilled with a ¼-in. dia. duct passing radially from the surface to the hollow shaft. Ball-bearings could then be rolled down the hollow shaft to the centre of the fly-wheel, from where they would be thrown centrifugally along the radial duct to leave the edge of the outer casing through the single ¼-in. dia. hole. The velocity of the projectile could be varied by varying the speed of the fly-wheel.

Simpler Method needed

There was no doubt that these methods would have presented many practical difficulties and so, finally, they were passed over in favour of a simpler method which, whilst it would not give information over the whole range of speed, would at any rate give information on the specific speed range selected. It was learned that an air rifle could be modified to give mean projectile velocities within the range 300 to 500 ft. per sec., using a ¼-in. dia. ball-bearing as a projectile. It was decided, therefore, to undertake construction of a suitable rig for this weapon, in order to procure further information quickly.

AIR-RIFLE TEST-RIG

A prototype weapon was produced by B.S.A. (Guns), Limited. The barrel and the loading plug were opened up to take a ¼-in. dia. ball-bearing, and the mechanism was modified so that the weapon imparted to its projectile a mean velocity within the required range of 330 to 400 ft. per sec. A section view of the rifle-muzzle locating cylinder, and specimen holder, is given in Fig. 1. Fig. 2 shows the test rig without the weapon, and with the specimen-

holder guard removed, and the complete rig can be seen in Fig. 3.

Description of Components

The aluminium base-plate, which is 34 in. long and 8 in. wide, incorporates at its left-hand end a micro-adjustable vee-block, with a fixed vee-block at a distance of 14¾ in. centres. The weapon rests on these vee-blocks, with its muzzle inserted in the centre opening provided in the left-hand end of the mild-steel muzzle-locating cylinder. The rifle may be aimed at any part of the specimen by adjusting the micro vee-block and rotating the specimen. The inside surface of the left-hand end of the locating cylinder is protected by means of a rubber sleeve, and the end of the rifle muzzle is also protected from shots which ricochet from unbroken lenses. This protection of the muzzle end is of great importance, as the impact of spent shot thereon is sufficient to burr it over, thus reducing its exit diameter. The first weapon that was used had to be reground owing to damage sustained in this way.

The aluminium specimen holder is lined with a mild-steel bush having an internal thread. When a specimen has been placed in the holder it is held at the back by a clamping sleeve, which is retained in position by the mild-steel locking-tube screwed up behind the head. Early tests were done with the specimens held between the aluminium faces of the specimen-holder and the clamping-sleeve, the locking-tube being screwed by hand until the specimen was just held. This system was sufficient for preliminary work, but for a standard rig the specimen should be held between gaskets, and the locking tube tightened by means of a torque spanner operating on a nut affixed to the closed end of the tube.

The locking-tube, with its closed end, is also used to absorb the spent ball if the specimen should fail. For this reason it is packed with cotton wool, but a layer of plasticine is placed over the wool at a distance of ¼ in. behind the specimen. Shots which have penetrated the specimen will, therefore, embed themselves in the plasticine. Shots which fail to penetrate the specimen rebound violently, so a guard is fitted over the specimen holder, large enough to cover also part of the rifle-muzzle locating-cylinder and so close the gap between locating cylinder and specimen holder.

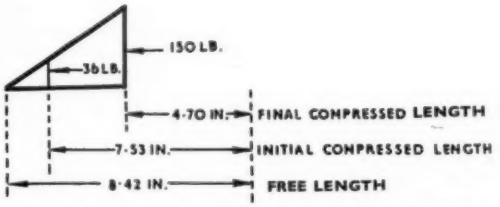
Calibration

All specimens were cut to 50-mm. dia. circles. The projectiles were standard 0.25-in. dia. ball-bearings, hardened to 63/65 Rockwell "C." and guaranteed to within 0.0001 in. of nominal size and sphericity. The weapon was a prototype modified B.S.A. "Airsporter" of the following specification:—

(1) Barrel bore H 0.2503 in.
L 0.2501 in.

(2) Barrel loading plug—bore size 0.260 in.

(3) Mainspring. Standard spring set to reduced free length.



(4) Maximum fibre stress (mainspring) 158,500 lb. per sq. in.

(5) Method of recording velocities. Works "Holden" chronograph.

(6) Suggested limits of chronograph accuracy ±2 per cent.

(7) Mean observed velocity (over 5 yards) 390.4 ft. per sec.

(8) Projectile. Standard ¼ in. spherical steel ball-bearing.

(9) Weight of projectile 16.1 grains (1.043 grammes).

(10) Mean propulsion force 93 lb.

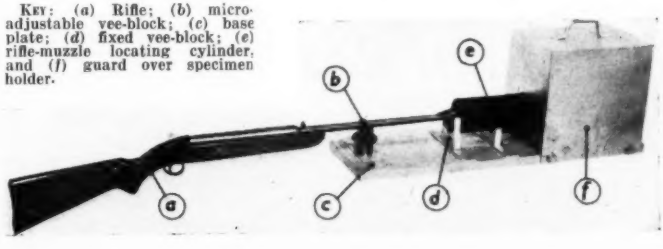
(11) Mean propulsion energy 22 ft.-lb.

(12) Muzzle energy of projectile 5.44 ft.-lb.

(13) Mechanical efficiency of weapon 24.7 per cent.

Test Procedures

All the tests were carried out at temperatures between 65 and 75 deg. F., the rig and the specimens having first been allowed sufficient time to reach the ambient temperature of the room in which they were tested. It was learnt that the properties of plastic materials varied somewhat with temperature, and that the variation itself was different for different materials. It has not, of course, been possible in the time available to test all conceivable combinations of the various materials that might be used, although it is hoped that the whole range will be explored in due course. When this is done the temperature at which the tests are made may be of some importance.



KEY: (*a*) Rifle; (*b*) micro-adjustable vee-block; (*c*) base plate; (*d*) fixed vee-block; (*e*) rifle-muzzle locating cylinder, and (*f*) guard over specimen holder.

FIG. 3.—*Complete test-rig with rifle and guard in position.*

Foundry Goggles

The sub-committee were informed that the velocity of the projectile would remain constant over a large number of shots. Even so, the velocity has been checked at different stages of the work, and a record has also been kept of the number of shots fired (in an attempt to determine at what point the velocity begins to fall, if this in fact occurs). So far the initial velocity has been maintained, but this is obviously an important matter in continuous testing.

Plasticine must be placed in front of the cotton wool in the sleeve-locking tube, and care must be taken to ensure that there are no ball-bearings in this plasticine when a lens is tested. This is important because it has been found that some thin specimens, which had been penetrated by a shot, showed only a very small hole on subsequent examination. For instance one specimen was indented by a shot, and at the base of the indentation there was a hole no more than $\frac{1}{4}$ in. diameter. On first examination it was thought that the specimen had withstood the missile, and had merely been indented and cracked at the base of the indentation by the impact. However, when the sleeve locking tube was removed the missile was found in the Plasticine. Clearly it had penetrated the specimen. The $\frac{1}{4}$-in. diameter ball had left a hole no larger than $\frac{1}{4}$ in. dia., so that the plastic must have opened up for the passage of the projectile and closed again behind it. It is therefore essential that the Plasticine be kept free of spent ball-bearings, so that if one is found therein after a test it can be stated with confidence that the ball in question had indeed penetrated the specimen, whatever the final state of the specimen might be. The guard should be placed in position for every shot, because projectiles rebound with some violence when the specimens withstand the blow.

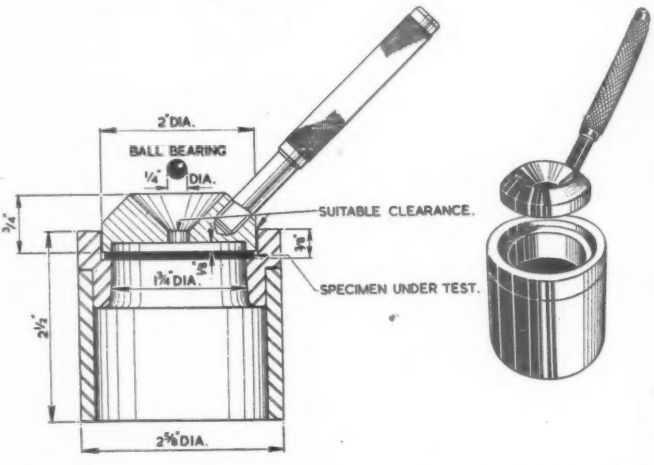


FIG. 4.—*Equipment for carrying out burning tests on plastic lenses.*

First Procedure

Two test procedures have been used. In the first, each specimen was submitted to one blow only at the centre. This test was repeated a number of times so that the materials could be placed in an order of merit, *e.g.*, those which always failed, those which sometimes failed and those which never failed. Originally, it was thought that lenses which had failed no more than a certain percentage of first tests might have to be accepted. Later, however, lenses were found which never failed on the first test.

Second Procedure

The second procedure was used to test to destruction. Lenses which were known to be strong enough to withstand the first procedure were placed in the testing rig, and successive projectiles were fired at the centre of each lens until it was cracked, broken or penetrated—the lens being examined between each shot. It was appreciated that each shot would stress the material of the specimen, so that no two of the shots would be fired at the material in the same state of internal stress. Nevertheless, it was thought that the total number of shots would give some indication of ultimate strength. Certainly this procedure gave conditions much more severe than would occur in practice, when it is hardly conceivable that a goggle lens would be struck even twice on precisely the same spot.

Results of Impact Tests

The tables published in the full Report show that all the glass specimens (toughened and laminated) failed completely, being shattered and penetrated by the first shot.

The 3-mm. wired-acetate specimen also failed, not because it was penetrated, but because it bent and cracked and the back surface, which would have been adjacent to the wearer's eye, threw off a heavy shower of splinters. The 4-mm. wired laminated-acetate specimen withstood the first shot, and cracked without splintering on the second shot.

One of the three Triplex laminated-plastic specimens was penetrated, and only the thickest one was successful. This one cracked, but the two thinner ones threw off splinters from the back surface—splinters which might well go into the eye of the wearer.

Single plastic lenses failed up to and including

3-mm. thick. Some of the 3-mm. lenses withstood one blow, but others were penetrated by the first shot. It appears that some plastics are strong enough if they are 4 or 6-mm. thick, but others still fail. Overall thickness is no real criterion, because thinner double lenses were superior.

Double lenses with varying thicknesses of different plastics were tested. These lenses consisted simply of two layers of plastic material placed together, with the thinner layer receiving the blow. The two layers were not stuck together in any way, so they have been called "double lenses" to distinguish them from true laminated lenses, in which the layers are held together by an adhesive. The following double lenses were satisfactory:—

(*a*) 0.050 in. Celastoid + 0.080 in. Celastoid.
(*b*) 0.060 in. Celastoid + 0.080 in. Celastoid.
(*c*) 0.040 in. Vybak + 0.060 in. Vybak.
(*d*) 0.060 in. Vybak + 0.060 in. Vybak.
(*e*) 0.040 in. Celastoid + 0.060 in. Vybak.

The sub-committee wish to emphasize that the materials listed above may not be the only materials which are satisfactory for this purpose. There may be other materials which have not been tested, or of which the committee is not aware, which may give equal or better results.

OTHER TESTS

Burning

Equipment

Hot-solid projectiles may be embedded in plastic lenses which they have failed to penetrate, so it is necessary to determine the resistance of plastic specimens to heat that might be applied in this way. In earlier tests on the effects of heat, a hot ¼-in. dia. ball-bearing (at 900 deg. C.) was laid on the top surface of a horizontal lens, and the time taken for the ball to penetrate noted. In order that the hot ball should not roll about, the centre of the lens was countersunk. However, this virtually reduced the thickness of the lens, and it was thought that this was undesirable. In consequence the equipment shown in Fig. 4 was constructed. The hot ball is placed in the funnel and centres itself at once on the lens. The funnel is immediately lifted off, so that it does not cool the ball. If the ball penetrates the lens, the time of penetration is noted.

Results

Only certain lenses, selected from the impact tests, were tested, and the results are given in Table 1. When the double-lens plastic materials mentioned above were tested some smoke was produced, although none of the specimens took fire.

All these materials were penetrated when tested as a single layer of about 0.060 in. thick, the Celastoid taking 10 sec. and the Vybak 1 min. 14 sec. The best impact results, however, had come from double lenses, and in no case did the hot ball penetrate these.

Miscellaneous Tests

Some tests were done on the needle-test machine described in the first Report, and the results are given in the unabridged Second Report. Now that some suitable materials for lenses have been found, complete goggles must be tested. An impact-testing rig is now being made by the sub-committee.

TABLE 1.—*Burning Tests on Plastic Materials.*

Test No.	Material.	Thickness.	Remarks.
		In.	
1	Celastoid	0.060	Smoke. Ball penetrated after 10 sec.
2	Vybak	0.060	Little smoke. Ball penetrated after 1 min. 14 sec.
3	Perspex	0.0625	Very little smoke. Ball penetrated after 21.7 sec.
4	Celastoid + Vybak	0.040 0.060	Smoke. No penetration
5	Perspex + Vybak	0.040 0.060	Little smoke. No penetration
6	Vybak + Vybak	0.040 0.060	Little smoke. No penetration
7	Vybak + Vybak	0.060 0.060	Little smoke. No penetration
8	Celastoid + Celastoid	0.040 0.080	Ball penetrated 17.1 sec.
9	Celastoid + Celastoid	0.050 0.080	Ball virtually penetrated but did not fall
10	Celastoid + Celastoid	0.060 0.080	Ball penetrated after 41.6 sec.
11	Vybak	0.040	Ball penetrated after 19.2 sec. Prolific smoke
12	Vybak	0.060	Ball virtually penetrated after 1 min. 40 sec., but did not fall

CONCLUSIONS REACHED

(1) The conclusions reached in the First Report were confirmed and amplified.

(2) Impact tests can be done with cold-solid projectiles, so long as the effects of heat are estimated by means of other tests.

(3) Impact-testing should be done at a velocity at least 20,000 ft. per min.

(4) All toughened and laminated glass lenses completely failed the impact test, and were also cracked and broken by molten projectiles. They are therefore unsuitable for use in foundries.

(5) Certain laminated plastic lenses, and certain double plastic lenses, withstood the impact test, and were also satisfactory against heat tests. Other types of plastic lenses may well be developed in the future, but there is no doubt now that existing and easily-available plastic materials will give complete protection against the fairly severe tests that have been applied. The view is therefore taken that lenses of these types are suitable for use in foundries.

(6) These plastic lenses will have to be securely mounted in suitable frames, and the testing of complete goggles and spectacles will therefore be the next stage of the sub-committee's work.

(7) The ophthalmological properties of the selected lenses must now be investigated, and work has already started on this.

Acknowledgments

The sub-committee is greatly indebted to Mr. Livermore of the Midland Motor Cylinder Company, Limited, for facilities for practical work, and to the Directors of B.S.A. Guns, Limited, for the prototype air-rifle (without which none of the work could have been done). It is also under obligation to Triplex Safety Glass Company, Limited; I.C.I., Limited; B.X. Plastics, Limited; British Celanese, Limited; Bakelite, Limited, and Parmalee (G.B.) Limited, for providing specimens.

Founders' Company at BSCRA

As already briefly announced, during the Spring Tour of Sheffield and district by the Worshipful Company of Founders on May 1, a visit was paid by some twenty of its members to the research station of the British Steel Castings Research Association. Because of the absence, through illness, of the Association's chairman, Mr. C. H. Kain, the visitors were welcomed by Mr. F. W. Rowe, who emphasized that BSCRA was the world's only collective research organization serving the steel castings industry which had research facilities of its own.

In his speech, Mr. Rowe surveyed briefly some of the Association's foremost achievements, especially those relating to the improvement of processes, and to industrial health problems. He noted with satisfaction that average annual subscriptions by members were about twice the national average for contributions to industrial research associations. The Master of the Founders' Company, Mr. G. W. Ilsley, thanked the Association on behalf of the visitors for the interesting tour of the foundry and laboratories, and congratulated the director, Dr. A. H. Sully, on his work in conducting the Association's research activities.

Five-year Plan for DSIR

A new five-year plan which would involve a 70 per cent. rise in the department's expenditure of £61,000,000, is outlined in the 1958 report of the Department of Scientific and Industrial Research. An expansion of information and advisory services and in grant-aided research associations is envisaged.

As part of its drive to increase the number of scientists and technologists pursuing advance studies, the DSIR aims to raise the number of new studentships in universities and other institutions from some 1,000 in the current period to 1,900 in 1963-64.

It is believed that valuable ideas exist in some of the smaller industrial concerns which they themselves cannot afford to investigate, and research and development projects that even large organizations cannot adequately finance.

Sir Harry Jephcott, chairman of the council, stated that it was an entirely new idea. "How many small companies will be appropriate subjects for Government backing we do not yet know, but the department is ready to consider proposals for the support of industrial research and development, whatever the scale, which is likely to lead to results."

Liverymen of the Worshipful Company of Founders who visited the research station of the British Steel Castings Research Association on May 1, as part of their three-day tour of Sheffield and district. They are (left to right): Mr. J. M. Middleton, Mr. C. M. Stoch (BSCRA); Mr. A. H. Catton; Mr. P. H. Swan; Mr. D. Cherry Paterson; Mr. W. G. Fossick; Dr. A. H. Sully (director, BSCRA); Mr. S. E. A. Farmer; Mr. J. Alan Prior; Mr. G. W. Ilsley; Mr. J. F. Stanier; Mr. A. F. Mitchener; Mr. F. W. Rowe; Mr. F. Webster; Rev. R. B. R. Walker; Mr. J. L. Wheeler; Mr. Harvey B. Young; Mr. V. E. Upton; Mr. N. C. Crighton; Mr. W. A. Hill; Mr. H. C. Bradbrook; Mr. H. Wilson Wiley (clerk of the Company); and Mr. J. C. Thomson (under warden).

Baker Perkins at the Careers Exhibition

Baker Perkins, Limited, will have a stand at the National Education and Careers Exhibition, scheduled to be held at Olympia, London, from May 26 to June 5. The Baker Perkins' exhibit will show the training schemes that are in existence in their organization, which are designed to enable young people to fill a wide range of worthwhile positions in the group. The stand will be staffed by members of the group's personnel department.

Institution of Production Engineers' Conference

A two-day conference with the theme of "Quality in Industry," organized by the Institution of Production Engineers, is to be held at the Palace Hotel, Buxton, on June 18 and 19. Papers to be presented will cover the field of engineering, woodworking, textile and leather industries, and will deal with design, planning, manufacture, etc. The conference fee is £5 5s. 0d. Details are obtainable from the secretary of the Institution, 10, Chesterfield Street, London, W.1.

A Post-war Ulster Foundry

The directors of Hugh J. Scott & Company (Belfast) Limited, Volt Works, Belfast, manufacturers of a.c. and d.c. electrical machinery, decided in February, 1952, to establish a foundry for the production of light grey-iron castings to be used in the manufacture of their products. A limited liability company known as S.B.W. Engineers, Limited, was formed for this purpose, and a foundry building was erected on part of the Volt Works factory site, with room for expansion. A floor area of approximately 10,000 sq. ft. was carefully laid out (Fig. 1) to accommodate machine-moulding, plate-moulding and floor-moulding, together with the necessary coreshop-ovens, and the usual sand-preparing plant, and Centriblast and fettling equipment.

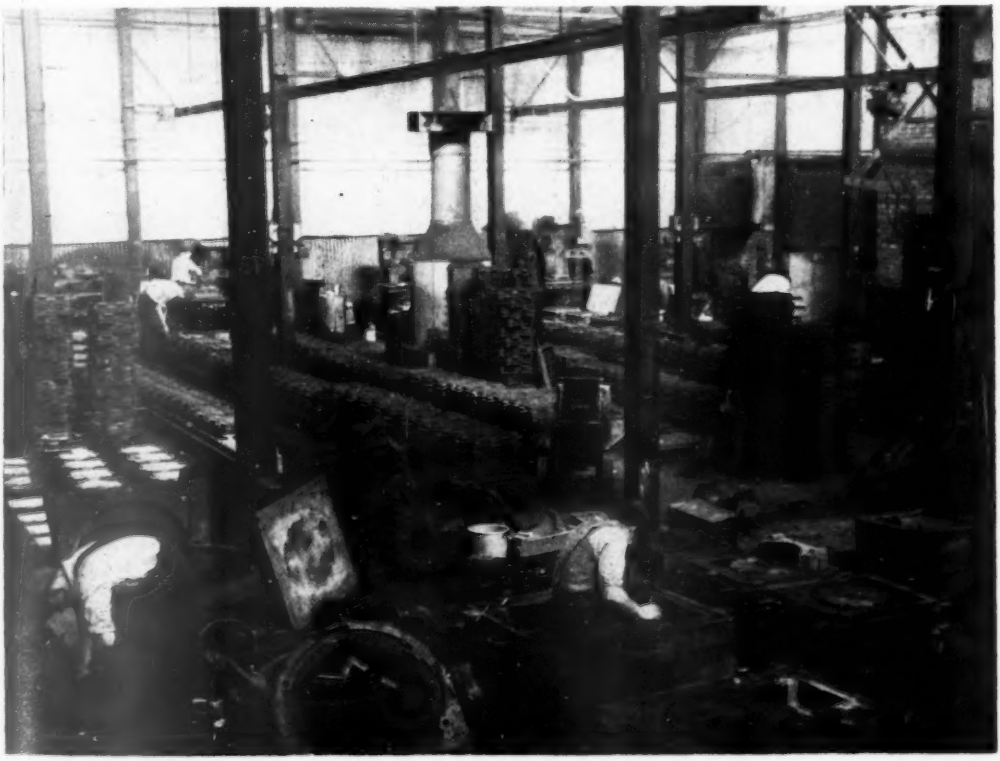
Floor and Machine Moulding

The floor-moulding bay in which the large castings are made has a three-ton overhead crane, whilst the moulding-machines and roller-conveyors are served by electrically-operated monorails hoists. A mechanical charger feeds the three-ton-per-hour cupola, the fan delivering the blast being driven by a 12½-h.p. Scott motor. An air line is connected to the four modern moulding-machines, in addition to other points where compressed air is required.

The various bays are well lighted, both day and night, and good ventilation is provided by fans set in the roof. The walls of the foundry being insulated, heat losses are reduced to a minimum, and in consequence there is an agreeable working temperature. A cloakroom with showerbath facilities is also provided for the employees.

At present, the foundry is turning out approximately 10 tons of castings per week, ranging from small covers of 1 lb. up to end frames and stators weighing 7-8 cwt. A special feature is made of producing castings with the particularly fine finish which is necessary in electric-motor work. A well-equipped patternshop and stores complete the suite of buildings. The foundry commenced operations in March, 1953, and now supplies castings not only to the Volt Works but to other engineering firms in Northern Ireland.

FIG. 1.—*General view of the foundry in Northern Ireland of S.B.W. Engineers, Limited, showing loose-pattern moulding in the foreground and machine moulding at the rear.*



New BNF Laboratory Block

On May 13 Sir Alexander Fleck opened a new laboratory block at the headquarters of the British Non-ferrous Metals Research Association in London. He unveiled a plaque engraved in titanium, symbolic of the increasing importance of the newer non-ferrous metals. This organization, supported both by industry and government, carries out research and provides technical services for producers, manufacturers and users of non-ferrous metals. The voluntary subscriptions of over 600 member firms, plus a government grant, provide 80 per cent. of the Association's total income of £200,000 per annum.

The laboratory block opened by Sir Alexander Fleck on May 13 is the first entirely new building that the BNF has been able to build since the war. With its completion, most of the research work can now proceed in laboratories planned for the purpose, instead of in improvised accommodation pressed into use to keep pace with the Association's growing activities. The choice of a central London site, with its consequent restrictions of available ground, is considered to be justified by the convenience to members visiting the laboratories. Day-to-day contacts with members are of the utmost value if the BNF is to serve industry effectively. Members make something like 1,000 visits each year, for discussion of technical problems, for committee meetings, to use the Library, or to see the work in progress.

The new building has been made possible by the generous response of members to an appeal for a special voluntary contribution to an extension fund, and by the Department of Scientific and Industrial Research, which has treated these contributions as grant earning.

Main Features of the New Block

The main features of the new laboratory block

FIG. 1.—*The new moulding bay at BNF, built to relieve congestion in the melting-and-casting shop. It contains plant for sand-moulding, the CO_2 process, shell-moulding and fettling, etc.*

are a much enlarged foundry, new corrosion- and physics-laboratories, and a new electroplating shop. Alterations which have been made to existing buildings have enabled a new creep-testing laboratory to be built to take over 100 units, and the former mechanical-testing laboratory to be converted into a fatigue laboratory. More space has also been allotted to apparatus for the determination of gas content in metals. Another important feature of the rearrangements is the creation of space where temporary equipment may be installed, for specific research projects, as the need arises.

Foundry

The first part of the new building programme to be completed was the extension to the foundry. Whilst there has been no radical change in the work of this section recently, researches requiring melting and casting facilities have increased considerably over the past five years, and the floor space became congested when the range of gas-fired crucible furnaces was extended and supplemented with a bale-out furnace for die-casting. Matters were made worse with the installation of a 600-lb. low-frequency induction furnace, for experiments with refractories, having the object of extending the use of this type of furnace to higher-melting-point alloys, such as cupro-nickels.

New Bay

A new bay (Fig. 1) has now been built onto the foundry, and all moulding, core-making and fettling have been transferred to this, leaving the original foundry for melting and casting only. The foundry is a busy shop since most of the experimental alloys needed for researches in other sections are prepared here, and the section has also a full programme of research on melting, casting and refining. In addition to sand-preparation plant, a small moulding-machine has been installed in the new bay, so that the standard castings used for research into the sand-casting qualities of metals can be moulded with better reproducibility. This is important in work on the influence of impurities, where it is necessary to eliminate the moulding variable as far as possible. The new bay also contains a shell-moulding machine, core ovens and storage space for patterns.

A separate laboratory leading from the new bay contains special melting equipment, consisting of a high-frequency induction furnace for melts of up to 20 lb. of copper or nickel. This furnace enables melts to be prepared under special atmospheres. A vacuum-melting furnace of similar capacity is also installed here.

Not strictly foundry work, but allied to it since it really involves a melting and casting operation, is the research work on high-temperature brazing in progress in another laboratory adjoining the foundry extension. Here there are furnaces for argon- or hydrogen-atmosphere brazing and vacuum-brazing of high-temperature steels, nickel alloys, and titanium.

Research Work in Progress

Gunmetals

The results of work carried out in the foundry have shown that, even with traditional materials like gunmetals, research still pays. The origin of compositions used at present is lost in antiquity, and a systematic study has made it clear that they can be improved. For certain purposes, particularly where thick sections are involved, not one of the gunmetals in common use is ideal. The best all-round combination of good mechanical properties, together with ease of casting, is obtained from an alloy outside the present specified ranges. To help in formulating sensible standards for gunmetals, the BNF is making a detailed examination of the effect of the main impurities. Many foreign standards specify limits for a whole range of impurities, though there is little published evidence to suggest that these impurities are harmful. Already, research has shown that sulphur, which is frequently limited in American and German standards, has no adverse effects, even when present in quite large amounts. The influence of arsenic, antimony, bismuth and iron is now being investigated.

Running and Feeding

In the long run the most important of the researches on casting is probably investigation into running, gating and feeding. The majority of defective castings are the result of lack of attention to these points. For some years, the basic principles of design of good running-systems have been under investigation. The Association is now assisting members to apply the results of such work to actual production.

Aluminium Alloys

Research work has been started on the casting, and properties, of high-silicon aluminium-silicon alloys which have recently been attracting attention in the motor industry. Other work in progress is concerned with improving the resistance of high-strength cast-aluminium alloys, used in the aircraft industry, to stress corrosion. Results so far obtained suggest that LM10, the popular aluminium-magnesium alloy, may be considerably improved by small modifications to the composition.

ECSC Finances Reflect Recession

Rise in expenditure and a heavy loss on the devaluation of the French franc, together with a fall in income, was suffered by the High Authority of the European Coal and Steel Community in 1958. Cash assets at December 31, however, amounted to nearly $150,000,000.

The main source of revenue is the tax on coal and steel companies, which yielded $28,170,000 ($30,730,000) and other income, mainly interest, fell to $16,790,000 ($18,450,000). Expenditure rose by $2,170,000 to $26,670,000. The loss on the devalued franc was $5,570,000.

VOSPER, LIMITED—Mr. John A. Metcalfe has joined the board.

Equipment and Supplies

Centrifugal Fans

A new range of "Gyra-Flo" Airfoil centrifugal fans has been introduced by Midland Heating & Ventilation Company, Limited, Bedford Road, Camp Hill, Birmingham 11. It has been claimed that the adoption of the Airfoil section blade, together with the streamlining of the airflow at the inlet to the fan, have enabled peak efficiencies of 92 per cent. to be achieved, with efficiencies of more than 80 per cent. for nearly half of the operating range of any size of fan. Airfoil fans are manufactured in sizes capable of handling from 400 cub. ft. per min. at 0.25 in. s.w.g. to 1,200,000 cub. ft. per min. at 16 in. s.w.g. Various bearing arrangements are available to meet site conditions, or to deal with higher temperatures.

The fans are now being fitted to Midac self-induced-spray-type wet dust-arresters (manufactured by the company), and on recent installations the following savings in absorbed horse-powers and runnings costs are claimed:—

Cub. ft. per min.		s.w.g. (in.)	h.p.		Per cent.
14,000	at	14.5	10	or	25
28,000	at	10	14	or	21
24,000	at	9	14.5	or	26.5
120,000	at	12	150	or	30

These figures illustrate the savings in running cost claimed from the use of these fans on plant which, from a foundryman's point of view, is essentially a non-productive piece of equipment.

Pilot Dryer

A new pilot dryer is being introduced by Birlec, Limited, Erdington, Birmingham, 24 (*Stand No. 34, First Floor, Hall D*), at the International Transistor Exhibition at Earls Court, London (May 21 to 27). The dryer is designed to dry air and gases for transistor manufacture, atomic-energy pilot-plant, furnace-atmosphere dewpoint control, stainless-steel brazing and general process use. It weighs 75 lb., is readily portable, and may be supplied with various desiccants, depending upon the intended application. The dryer incorporates two valves for the main flow, two valves for the reactivation flow, two thermometers, a pressure-gauge, and a heater warning-light and switch. For drying purposes, the unit is connected in circuit until the desiccant becomes saturated, whereupon it is removed from circuit and reactivated by a built-in heater system. With a desiccant capacity of 0.25 cub. ft., the dryer is basically a round-ended cylinder 9 in. in dia. and 3 ft. 2 in. high. The reactivation temperature may be controlled at any desired level between 100 and 300 deg. C. Reactivation heating takes some 2½ to 5 hr., and a cooling period of 2 to 3 hr. is necessary.

Arc-welding Transformers

Philips Electrical, Limited, Shaftesbury Avenue, London, W.C.2, announce the addition of three new models to their range of arc-welding transformers. They are as follows:—(1) ES.1370, giving an output of 65 amp. for welding with 14-s.w.g. electrodes; (2) ES.1371, with a maximum output of 175 amp. with 16/8-s.w.g. electrodes (high current), and (3) ES.1372, suitable for all heavy welding requirements, having a maximum output of 350 amp. with 16/4-s.w.g. electrodes (¼-in. intermittent—high current).

English Electric Again underbids US Firms

Once again the English Electric Exporting & Trading Company, Limited, a subsidiary of the English Electric Company, Limited, is apparently the lowest bidder for a contract to supply eight turbines for the Big Bend dam project, South Dakota. The bid of $6,467,313 (about £2,309,750) was nearly $3,000,000 (£1,071,000) lower than the lowest from three other bidders, all US firms.

This is the second time the company has underbid its nearest US competitor by more than the "Buy American" Act differential of 12 per cent. since it was deprived of the Greers Ferry dam contract. Neither this nor an earlier generator contract is likely to be decided for a considerable time. If the Office of Civil and Defence Mobilization rules against the domestic industry's petition for greater import protection, the Army Corps of Engineers has still to decide the issue on national security grounds.

Meanwhile, arising from the success of the British firm of C. A. Parsons & Company, Limited, in winning the recent $12,000,000 Tennessee Valley Authority contract, OCDM has been asked by the Commerce Department to bar imports of giant steam turbines for Federal power projects. The department has also been urging similar restrictions on hydraulic turbines and other heavy generating equipment.

The Commerce Department argues that Parsons' facilities in Canada are inadequate to repair the giant turbines of 500,000 kw capacity or more and there is a possibility that the UK firm may be asked to participate in an improved maintenance centre for such equipment.

Increased Borrowing Powers for David Brown Corporation

Present rigid limitation on the borrowing powers of the David Brown Corporation, Limited, has been having an adverse effect on the continued progress of the group and the board therefore plans to raise its borrowing to a present ceiling of £5,000,000.

It is proposed that in future the aggregate borrowings of the group (excluding inter-company borrowings) shall not, without the sanction of an ordinary resolution, exceed the greater of an amount equal to the paid-up capital of the parent, or an amount equal to 75 per cent. of the paid-up share capital of the parent and the consolidated reserves of the group as shown by the latest published consolidated balance-sheet of the group.

The machine-tool division of the group has won a "substantial" order for turbine gear machine tools from the West German heavy engineering concern, Demag, despite strong competition from German manufacturers. With this contract in hand the company claims that 80 per cent. of its order-book is at present for export, compared with an average in this country of 25 per cent., and in West Germany of 52 per cent.

A NUMBER OF SMALL NETHERLANDS SHIPYARDS have received an order for building a total of 32 steel motor cutters for Denmark. The shipyards will build only the hulls (82-ft. long), and these will be completed by Danish yards as motor cutters of 90 to 95 tons, propelled by 260 to 300 h.p. engines The order is a result of the Danish fishing industry changing over from wooden to steel fishing vessels.

National Industrial Safety Conference

Approximately 1,000 safety specialists from every branch of British industry gathered in Scarborough during the weekend of May 8 to 10 for the National Industrial Safety Conference organized by the Royal Society for the Prevention of Accidents. Countries overseas were well represented, there being delegates from France, Germany, Denmark, Holland and Belgium. Mr. T. W. McCullough, H.M. Chief Inspector of Factories, and Mr. J. R. Wilson, H.M. Chief Inspector of Factories for Northern Ireland, were also present.

The conference was opened by Sir George Barnett, a vice-president of the Royal Society for the Prevention of Accidents and a former Chief Inspector of Factories. Sir George described some of the work carried out by the industrial safety division of the Society over the previous year. He made particular reference to work which was now being done to improve the standards of safety training in technical schools and colleges, and the steps which private industry was taking to see that the training of their own operatives was carried out with a full understanding of the safety requirements of each individual job.

At the conclusion of his address, Sir George presented the Sir George Earle trophy to this year's winner, Vauxhall Motors, Limited. The trophy, a silver Georgian inkstand presented by Sir George Earle for the company or organization making the most meritorious contribution to safety in British industry, was received by Mr. J. R. Pearson, deputy chairman of Vauxhall Motors, Limited.

National Safety Records

This year the Society was honoured by the presence of Mr. Marcel Robert, chief of the occupational safety and health division of the International Labour Office, who presented a paper entitled "an Appreciation of the Voluntary Aspects of Industrial Accident Prevention." After paying tribute to the work of the Society Mr. Marcel went on to give a comparison of national safety records throughout the world. The records he said, were based on employment injury compensation data or on a compulsory accident reporting system. The lowest national rates, both immediately before and after the second world war had been achieved in the United Kingdom.

With a few exceptions, the order of countries had not changed substantially between 1938 and now. The manufacturing industries in the United States, Canada, the Netherlands and Belgium also had fatal accident rates which were rather below average, although they were two or three times higher than the corresponding figures for the United Kingdom. Furthermore, it was in the United Kingdom and the United States that the reduction in the rates had been greatest, being of the order of 54 per cent. If it be assumed that the ratio of fatal to non-fatal accidents in the manufacturing industries did not vary in any great measure among the countries listed, it was not unlikely that a similar picture would obtain in the case of non-fatal accidents. Reductions of the order of 30 per cent. had been achieved between 1938 and 1957 in the total accident rates in factories, both in the United Kingdom and the United States. He said it was his personal belief that there was a definite relationship between the industrial safety record and the successful development of the voluntary safety movement in these two countries.

The chairman of the working sessions which opened on the Saturday morning, was Mr. T. R. Tunstall, who until recently, was safety officer of the Ruabon factory of Monsanto Chemicals, Limited. The morning session opened with a paper by Mr. W. M. Larke, general manager (General), Stewart and Lloyds, Limited, who spoke on safety organization in a factory and how existing administrative departments could assist that organization. He was followed by Mr. K. S. Marsh, training officer of C. & J. Clark, Limited, who presented a paper entitled "Safety as a Taught Skill." The Saturday afternoon sessions were occupied by papers on "Machine Design for Safety" by Brian Shackel, research psychologist of E.M.I. Electronics, Limited, and "Preventing Falls" by J. A. Hayward, superintending safety officer of John Laing & Son, Limited.

Over 50 firms supplying such industrial safety equipment as clothing, machine guards, barrier creams and skin cleansers exhibited their products in the exhibition of industrial safety equipment held in the Corner Café.

British Standards Institution

Amongst New British Standards listed in the May issue of *BSI News*, published by the British Standards Institution, is No. 2970: 1959 Magnesium and magnesium-alloy ingots and castings for general engineering purposes. The standard specifies requirements for magnesium in the form of ingots, and for seven magnesium alloys in the form of ingots and castings in various conditions. Sections one and two contain general clauses applicable to ingots and castings respectively, covering freedom from defects, provision of test samples, tensile tests, re-tests, inspection, and testing facilities. For castings, a test for pressure die-casting is also specified. Dimensions of standard test-pieces are included. Section three contains specific clauses including chemical composition, condition and mechanical properties of each material. This standard supersedes B.S.1272-1280.

A new code of practice—CP 2003:1959 Earthworks—deals with earthworks in connection with civil engineering works but excludes consideration of such works as tunnels, dams, dykes, canals dredging, and river training works. Part 1 is concerned with cuttings and embankments and, in addition, with general advice on such matters as soil classification, weather conditions, and the economies of earthwork design. It gives very full guidance on cuttings, embankments, shallow cut and fill, compaction methods, the use of plant, and the protection of earth slopes. Part 2 deals with trenches, pits and shafts, with recommendations as to excavation in all types of soil, timbering and the use of explosives. Tables and figures are included which cover soil characteristics, accepted methods of timbering and supporting excavations, and blasting. The code is mainly concerned with conditions in the British Isles, but makes occasional reference to conditions overseas when this seems desirable.

Copies of these standards are obtainable from the sales branch of the Institution, 2, Park Street, London, W.1, at a cost of 8s. 6d. and 25s. respectively.

Mr. K. F. DORMER, president of the Institution of Plant Engineers, speaking at a meeting in Harrogate on May 7, said that the many factories in Britain which relied on obsolete machinery could not hope to compete for long if they continued to operate with such a disadvantage. He added "We have always prided ourselves on quality goods, but in order not to price ourselves out of world markets we must accept changes in manufacturing techniques."

D

National Society of Master Patternmakers

Annual Meeting and Social Function in Blackpool

The fifth annual meeting of the National Society of Master Patternmakers was held at the Norbreck Hydro, Blackpool, on the afternoon of May 9, with Mr. L. Brown in the chair, accompanied at the dais by the vice-president, Mr. W. D. Hartley, the assembly including representatives of 17 member-firms, together with Mr. G. W. Firkins, for the secretaries. Initially, Mr. Brown explained that he was occupying the chair in the absence of Mr. R. Scott, the president, who was unfortunately prevented from attending. After apologies for absence and the Minutes of the fourth annual general meeting had been dealt with, Mr. Brown said that as Mr. Scott was unable to attend and had been unable to prepare his report, Mr. Hartley would give a brief review of the affairs of the Society when he spoke later that evening. It had been mainly a year of consolidation, he added, and, as members would know, a visit abroad had been undertaken. Accounts for 1958 and the budget for 1959 were next disposed of.

Election of Officers

Proceeding to the election of officers for 1959/60, Mr. Brown said that it was the wish of the Council that Mr. W. D. Hartley should be elected president of the Society for 1959/60 and, from the chair, he proposed that he be so elected. This was carried with acclamation and the chairman then invested Mr. Hartley with the badge of office, saying that he was particularly pleased to do so in the case of an old friend. Mr. Hartley, in acknowledging,

Scenes at the annual dinner/dance of the National Society of Master Patternmakers, held in the Norbreck Hydro Hotel, Blackpool, on Saturday, May 9. (Left) Mr. W. D. Hartley, NSMP president, and Mrs. Hartley receiving members and guests. In this case it is Mr. B. G. Darby, of Fellows & Darby (the president's own firm), who is being greeted.

Obverse and reverse of the Levy silver medal presented to Mr. H. G. King at the annual dinner of the National Society of Master Patternmakers.

promised he would endeavour to serve the Society well and asked Mr. Brown to continue to occupy the chair for the remainder of the meeting. As vice-president, Mr. E. C. Rowen was then elected and he, too, was invested with a badge of office. Of the retiring members of Council, Mr. T. Ward and Mr. H. W. Werge did not wish to be re-elected and nominations were thus approved in their stead from Mr. D. Cook (Universal Pattern & Precision Engineering Company, Limited) and Mr. J. Vickers (John Vickers & Sons, Limited). Thus, the present Council is constituted as follows: The president and vice-president with the past-presidents, Mr. B. Levy, Mr. L. Brown, Mr. N. Gott and Mr. R. Scott and as ordinary members of Council (in addition to Mr. Cook and Mr. Vickers), Mr. H. R. Dowler, Mr. V. C. Faulkner, Mr. J. J. Harvey, Mr. R. W. Mousley, Mr. W. J. Stansby, Mr. T. Storey, and Mr. A. Whitehouse. Mr. Whitehouse was also re-elected as honorary auditor.

Under "any other business," the venue for future annual general meetings was discussed and Mr. Brown asked that members should let the Council know, after the dinner/dance, if they thought the week-end at a seaside resort was a good idea for repetition in the future. He also expressed a warm welcome to such a large contingent of members from the Coventry area who were present at the meeting. A vote of thanks to the secretaries, on the proposal of Mr. Brown, then terminated the meeting.

As briefly announced in last week's JOURNAL, the annual dinner/dance of the Society was also held at the Norbreck Hydro, when 100 members, guests and ladies attended. Mr. Hartley, who was in the chair, in replying to the toast proposed to the "Society and the President," briefly reviewed in general the activities of the Society over the five years of its existence. These, he said, included the bringing about of the revision of the specification for wooden pattern equipment —which specification should be in the hands of every buyer; representation on the City and Guilds Advisory Committee of the Institute of British Foundrymen and on its Foundry Technical Committee; important work with the Timber Trade Development Association on matters germane to members was being carried out; other work was in conjunction with the Engineering and Allied Employers' Federation, and ancillary matters.

Mentioning the visits to patternshops in both France and Germany which had already taken place, Mr. Hartley said this year it was hoped to visit master patternshops in Italy. At this point, he expressed the thanks of the Society to the directors, Editor and Assistant Editor of the FOUNDRY TRADE JOURNAL for their good offices at all times and particularly to Mr. V. C. Faulkner, their chief guest that evening, for his help in organizing the visits overseas. Mr. Hartley then referred to future activities and said it would be appreciated if members would let the Council or the secretary know their wishes as to what pattern the programme for the ensuing year should follow.

During the dinner a formal presentation of the Levy silver medal was made to Mr. H. G. C. King for his excellent development work in connection with the making of plastic patterns.

President, past-presidents and vice-president of the NSMP at the annual dinner/dance.

From left to right: Mr. E. C. Rowen, vice-president; Mr. W. D. Hartley, president, with Mr N. Gott, Mr. L. Brown and Mr. B. Levy, past-presidents.

French Foundry Congress

Association Technique de Fonderie

The 32nd Congress of the *Association Technique de Fonderie* (French foundrymen's technical association) is to be held on June 1 and 2 at the headquarters of the *Association*, 2, rue Bassano, Paris, 16. It opens at 9 a.m. with a formal opening address by the president, Mr. J. Lainé, after which the following papers will be presented:—

June 1, 9 a.m. Conference Hall

"Combined Effect of Contraction and Atmospheric Pressure on the Formation of Castings Defects," by Mr. F. Boussard (Conduites d'Eau, Liège); "Designing Castings from the Machining Angle," by Professor M. Skarbinsky (Warsaw); "Initial Results of a Comparative Study of the Behaviour of Water and of Various Foundry Alloys in Models of Running Systems, in Moulding Sand," by Mr. Jeancolas (*Centre Technique*) Mr. G. Cohen de Lara and Mr. H. Hanf (Grenoble); "Experiments at the Renault Works in Methods of Core-assembly in Hot Coreboxes," by Mr. Ph. Jasson (Renault)."

Afternoon Sessions

In the afternoon two sessions will be held starting at 2.30 p.m. In the Conference Hall, at session (*a*) the following papers will be presented:—

"Wet Enamelling of Cast Iron," by Mr. R. Piva (late of the *Centre Technique*) to be read by Mr. P. Deboute (*Centre Technique*); "Benefication of Cupola Metal through Treatment with Oxidation Salts," by Mr. A. Roos (Société Lorraine-Escaut); "Nodular-graphite Cast Irons at Elevated Temperatures," by Dr. A. M. Plesinger (Brno); "Foundry Applications of the TWA Process (developed by the *Institut de Recherches de la Sidérurgie* for the Desulphurization of Irons by the Injection of Powdered Chalk)," by Mr. B. Trentini, Mr. J. Raguin and Mr. J. Duflot who are attached to the *Institut*; "Comparative Analyses; Statistical Study of the Dispersion of Results and the Determination of Permissible Limits for the Various Elements," by Mr. V. Kuhn and Mrs. S. Ryser (*Centre Technique*). (At 6 p.m., there will be a summing-up of these papers by Mr. J. Lainé, president of the Association).

In the Council Room at 2.30 p.m. the following papers will be presented in session (*b*):—

"Contribution to the Metallurgical and Metallographic Study of Steel Castings," by Mr. M. Goguillon and Mr. P. Detrez (*Centre Technique*); "Solidification of A-S13 (Alpax)," by Mr. Cl. Mascré (*Centre Technique*); "New Method of Quality Assessment of Ingots and Castings of Copper Alloys," by Mr. P. J. Le Thomas, Mr. D. Arnaud and Miss A. Lethuillier (*Centre Technique*); "Contribution to the Study of the Moulding of Composite Castings," by Mr. L. Grand (Chambéry Research Institute); "Use of Plastics for the Making of Patterns and Coreboxes for the Quantity Production of Brass and Bronze Taps," by Mr. J. Vincent (Société de Robinetterie, Montreuil).

At 8.15 p.m., the Congress dinner will be held at Pavillon Dauphine, in the Bois de Boulogne.

Second Day

On June 2, the delegates will leave Paris at 8 a.m. in motor coaches for Verneuil (Oise) where from 9 a.m. to noon they will visit the Research Department of the French Coking Industry, luncheon being taken at Creil. Afterwards there is to be a visit to the Montataire Works of the Union Sidérurgique du Nord de la France. The coaches will arrive back in Paris at 7 p.m.

(No special arrangements are being made for ladies accompanying the delegates).

Youth in Industry

Speaking at a conference on "Youth in Industry," organized in Birmingham on May 13 by the Federation of British Industries, Mr. J. J. Gracie, director of the General Electric Company, Limited, Witton, said that although industry had little complaint about the academic standards of school-leavers to-day, yet the entrants to Diploma of Technology courses often lacked the qualities of drive, initiative, good manners and ability to speak and write well. Delegates to the conference, the purpose of which was to bring together industrialists and educationalists, heard Mr. Gracie urge schools to encourage overseas travel, sports and social activities.

Mr. A. A. Part, Under Secretary (Further Education) of the Ministry of Education, exemplified the "swing to science" of school-leavers by quoting statistics showing that the number of students passing the General Certificate of Education at "O" level in science had increased, between 1951 and 1958, by 137 per cent. in physics, 120 per cent. in chemistry, and 77 per cent. in mathematics.

Mr. Part said that a radical change was needed in the attitude of employers to commercial training; it was no use giving expensive training to engineers and scientists if the commercial side of industry was not correspondingly developed. Another point made by Mr. Part was the time lag in results of research reaching industry. He suggested that senior staff from technical colleges, in touch with the latest research, should be used as consultants or part-time directors of small firms to enable the latter to keep abreast of current trends. Mr. J. A. Hunt, general manager of the Hymatic Engineering Company, Limited, Redditch, illustrated how a relatively small-scale firm could launch training schemes.

Latest Foundry Statistics

Steel Castings. The employment situation in the steel-foundry industry, based on figures taken on March 7, showed a further deterioration according to the monthly *Bulletin* of the British Iron and Steel Federation and the Iron and Steel Board. The number employed on this date was 17,540, and 17,820 on February 7, a reduction of 280. Moreover, the weekly average production of steel castings was also lower, being estimated at 4,700 tons. This compares with 5,000 in February and 6,300 tons a year ago, all figures being estimated.

France Increases Quotas for UK Trade

An overall increase of 20 per cent. of French quotas on imports from the UK has been obtained in the latest Anglo-French trade agreement.

Commodities affected include agricultural tractors, refrigeration equipment, goods handling equipment, machine tools, and metal furniture. New quotas have been opened by France for computers, steel wool, oil, additives, and some other items.

Arrangements concerning trade in the non-liberalized sector between the UK and the Benelux countries in 1959 have also been agreed.

American Letter

Bend Tests*

The accepted practices of inspecting the mechanical properties of castings for guided missiles are reviewed. Most cast structures must be able to withstand bending loads, so bending tests have been investigated to obtain an idea of structural behaviour. In the past, the American Air Force missile department specified static

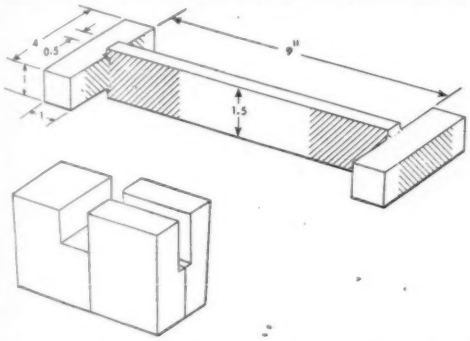


FIG. 1.—*Tee-bar casting for bend testing. Each casting provides two test specimens. The chills are shown in the lower part of the illustration.*

testing to destruction of three castings from the first production lot. This was done to establish an acceptable quality-level for radiographic inspection. Test engineers later added the practice of cutting a tensile specimen from any failed casting, the tensile-strength values obtained being then used as a levelling factor for the static-test results. About three years ago the author's company began to specify that a tensile specimen be machined from a critical area of production castings on a sampling basis. Comparative tests have shown that material having a higher tensile strength is often weaker in a given part than a lower-strength-material part having a high mechanical notch factor.

Comparison of A356 and C355

A comparison of aluminum alloys A356 and C355, in a threaded tubular joint under a bending moment, shows that the static tensile-strength of C355 alloy is 20-per cent. greater than A356, but the cast part is actually 20 per cent. weaker when made of C355 than when made of A356. A comparison of A356 and C355 in a beam much less severely notched than the casting mentioned above showed that the part made of the stronger alloy (C355) failed at less load than the part made of the weaker alloy (A356). A group of 40 test castings was therefore ordered to determine production variability, and to predict a minimum margin of safety for the structure. A statistical analysis of this test indicated that heat-treatment variations are one and a half times as significant as chemical-composition variations in producing a maximum-strength casting. The tensile tests showed a range of 1.6 per cent, whilst the beam-bending tests showed a range of 13.9 per cent. This indicated that bending strength was not necessarily proportional to tensile strength in castings, and that some investigation was necessary.

* Synopsis of work done by J. C. Graddy, who is production design engineer to the Douglas Aircraft Co., Santa Monica, California.

Test Method

In carrying out this investigation, a cast-to-size specimen was designed as an "H" section, and the pattern was made with matching iron chills and boxes for sand cores at the critical bending area. Fig. 1 shows the specimen and its chill areas. Fig. 2 shows the cantilever bending-test results for both sand-cast and chill-cast tee-bars of several aluminium and magnesium alloys. These castings were all free of radiographic defects at the critical bending area. The large range (two to one) of load for a given tensile stress indicates that tensile values are not reliable as a method for determining bending performance of a material.

New Specification

In order to obtain a better evaluation of bending behaviour, tests were begun on small bend specimens machined from castings. A study of the shape of the various load deflection curves indicated that an acceptable level of that vague quality ductility may be defined as a parameter of the curve shape. The width proved to have only a minor effect on the modulus of rupture over the range tested. The author offers, as a minimum

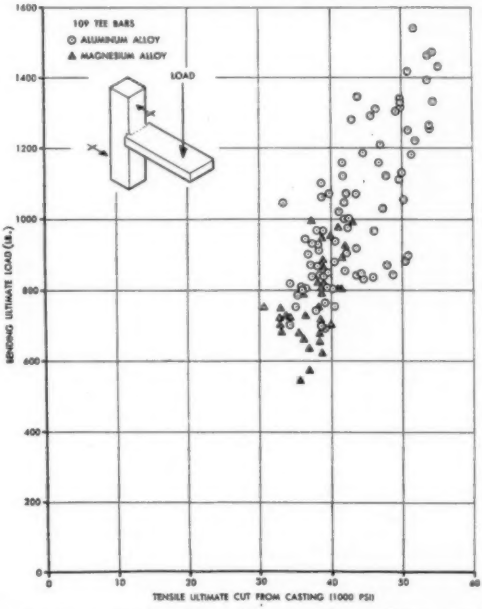


FIG. 2.—*Graph of tee-bar cantilever beam tests versus cut tensile tests, for sand- and chill-cast specimens of aluminium and magnesium alloys.*

acceptable degree of ductility, the following transverse test curve parameter: The total deflection offset, at the failure point, must be equal to or greater than twice the offset of the elastic line when it is projected to the failure or ultimate load. Future specifications for high-strength cast materials should include a demonstrated modulus of rupture stress, as well as tensile stress. It is hoped that other laboratories will investigate bending specimens along with their normal tensile-testing. A proved correlation between bend testing and static testing of cast structures will build much greater confidence in the tasks that good castings can perform.

Company News

English Steel Corporation, Limited

Owing to the general fall in demand the substantial order load with which the English Steel Corporation, Limited, started 1958 was not maintained. The value of deliveries was practically unchanged at £40,000,000, due to work carried forward from 1957, but incoming orders fell by 34 per cent. The falling off was reflected in the reduction of steel output from 582,000 to 505,000 tons, compared with the 1956 record of 590,000 tons. Ingot tonnage rolled also fell from 268,000 to 209,000 tons.

Group net profits fell from £2,686,242 to £2,275,152. For the year 10 per cent. is paid on the £9,000,000 "A" stock held by Vickers, Limited, and £3,000,000 "B" held by Cammell Laird & Company, Limited, compared with 12 per cent. on £6,000,000 "A" and £2,000,000 "B" for 1957. No dividend was received from Firth-Vickers Stainless Steels, Limited, due to a fall in demand for certain of the company's products.

The directors of Vickers, Limited, which, with Cammell Laird & Company, owns the ordinary capital of English Steel, report full production for most of the companies in the group for 1958. Highly competitive conditions persisted and, in some fields, intensified, but in spite of this, the group's achievements were satisfactory. Adverse conditions in the shipbuilding industry last year kept the volume of new orders at the low level reached in 1957, but the effect had been less immediate for shipyards building larger ships, such as those of Vickers-Armstrongs (Shipbuilders), Limited.

At the Palmers Hebburn works the dry docks were continuously occupied throughout the year and 70 vessels of a tonnage exceeding 648,000 tons were repaired and serviced. The overall steel supply position improved and constructional steelwork fabricated and delivered was 3,000 tons greater at 18,000 tons.

Group net profits rose from £6,202,629 to £6,592,257 and the dividend is repeated at 10 per cent. The 1957 interim was on a smaller capital, prior to the rights issue.

BEGWACO METERS, LIMITED—The company has concluded negotiations to become a member of the Parkinson Cowan group. Mr. J. C. Welch will continue as chairman of Begwaco Meters.

ROBERT HUDSON, LIMITED, light railway equipment manufacturers and iron and steel founders, etc., of Leeds—The interim dividend is being raised from 6¾ per cent. to 8¼ per cent. for the year ending June 30, 1959. The 1957-58 final was 8¼ per cent.

JOHN DALE, LIMITED, non-ferrous collapsible tube and aluminium and light-alloy casting manufacturers, etc., of London, N.11—A final dividend of 7 per cent. makes 11 per cent. for 1958 on increased capital (equivalent of 16½ per cent.). Trading profit was £337,543 (£428,861).

COWLISHAW, WALKER & COMPANY, LIMITED, mining machinery and power-press manufacturers, etc., of Stoke-on-Trent—The dividend is maintained at 20 per cent. for 1958, and a one-for-three scrip issue is proposed. Trading profit is £312,862 (£323,468), and the net profit is £135,191 (£129,676).

GUEST, KEEN & NETTLEFOLDS, LIMITED—A final dividend of 9 per cent. makes 13 per cent., against the equivalent of 11 7/11 per cent. Group trading surplus, after depreciation is £24,116,592 for the 53 weeks ended January 3, 1959, against £23,950,220 for 52 weeks. Net profit is £11,243,342 (£10,199,747).

SMITH & WELLSTOOD, LIMITED, stove and catering equipment manufacturers, etc., of Bonnybridge (Stirlingshire)—In a letter to shareholders, the directors state that the cost of the recent acquisition of Gardiner & Gulland, Limited, sheet-metal workers and kitchen engineers, of London, S.E.13, from Oliver Industries, Limited, has been met out of existing cash resources.

JOSHUA BIGWOOD & SON, LIMITED, engineers and manufacturers of steelworks plant, etc., of Wolverhampton—Group net profits fell sharply from £15,789 to £3,967 during 1958 and the total dividend is cut from 15 per cent. to 10 per cent., with a 5 (10) per cent. final. The chairman, Mr. H. R. Rowbotham, states that the recession in orders mentioned last year has intensified.

COVENTRY GAUGE & TOOL COMPANY, LIMITED—Agreement has been reached in principle with Repco, Limited, Melbourne, Australia, for the acquisition by that company of a 6 per cent. interest in Coventry Gauge & Tool (Australia) Pty., Limited, Bankstown, New South Wales. Subject to the approval of the Commonwealth Exchange Control, arrangements will be settled by the exchange of shares and will be effective from July 1.

CRAVEN BROS. (MANCHESTER), LIMITED, machine-tool makers, etc., of Reddish, near Stockport (Ches)—The directors state that trading conditions during 1958 were very difficult and deliveries exceeded the intake of orders, but the order-book at the end of the year was satisfactory. Recently orders and inquiries have increased in volume and it is anticipated that the tax concessions will encourage customers to renew equipment and extend their plants.

THOMAS BLACKBURN & SONS, LIMITED, constructional engineers and ironfounders, of Preston (Lancs)—The company has met with considerable difficulty during recent weeks in meeting obligations and as a result an informal meeting of creditors was held on May 12. The company has an issued capital of £190,000 including £130,000 in ordinary 5s. shares and a 5 per cent. dividend for the year ended June 30, 1958, was paid. At that date the consolidated balance-sheet showed a bank overdraft of £272,659 and creditors for £403,884.

G. & J. WEIR HOLDINGS, LIMITED, engineers and foundrymen, of Glasgow—Mr. J. K. Weir, the chairman, tells shareholders that in order to reduce the disparity between the interim and final payments, the directors intend to increase next year's interim, providing, of course, that the company's earnings are satisfactory at the time of declaration. The main feature of the group balance-sheet, he says, is the very satisfactory relationship between current assets and current liabilities, the latter being covered almost three times. The good output and lower input of 1958 had resulted in a contraction in the overall order-book position, but there is still plenty of work available for 1958.

FEDERATED FOUNDRIES, LIMITED—The chairman, Mr. J. N. Deas, says that, in addition to capital commitments of £65,000, plans to develop extensively one of the foundries are being closely studied; these will involve an expenditure of some £300,000. Provisional orders have been placed. No benefit can be expected from this outlay until late in 1960, he says. Further negotiations are in progress for the purchase of a controlling interest in three businesses not connected with ironfounding. If these plans and negotiations are completed a considerable part of the cash resources will be more profitably invested. Group net profit for 1958 was £161,531 (£129,410) and the dividend was repeated at 17½ per cent.

New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s.)

806,576. Hunter Engineering Company, 1495 Columbia Avenue, Riverside, California, USA.

Means and apparatus whereby a sheet strip or bar or rod of metal may be continuously cast, with, according to this invention, such uniformity in quantity and freedom from inclusions that the resulting casting may be treated to obtain a final product having the optimum properties of the metal.

806,803. British Iron and Steel Research Association, 11, Park Lane, London, W.1.

The casting of metal, in particular continuous casting, in which the liquid metal is poured into an open mould and is withdrawn from the mould as a partly solidified billet. An objective of this Patent is to enable the billet to be released from the mould with the minimum of sticking, while reducing the chances of rupturing of the billet skin.

806,942. Sunbeam Corporation, 5600 Roosevelt Road, Chicago, Ill., USA.

Sole-plates for electric irons, cast as a composite metal, of aluminium for lightness, with an ironing surface of stainless steel for resistance to scratching.

806,991. Phoenix-Rheinrohr, A.G. Vereinigte Hütten- und-Röhrenwerke, Ronsdorfer Strasse 130/180, Düsseldorf, Germany.

Apparatus for casting under reduced pressure. This method, it is claimed, should be simpler, quicker, and less expensive than previous equipment: it does not require either a vacuum chamber or an intermediate vessel. Also the joints which need to be sealed are considerably smaller.

807,038. R. U. Taccone, 28 Chautauqua Boulevard, Erie, Penns., USA.

An improvement on the "jolt" method for compacting granular material to provide a solid lining when casting articles in deep cavities in moulding sand.

807,044. Corn Products Refining Company, 17 Battery Place, New York, N.Y., USA.

New core binders, and a process for making cores suitable for use in the fabrication of metal castings. A typical mixture is as follows: to 100 parts of sand, there is mixed 0.25 to 2 parts of a cereal binder, 0.5 to 5 parts of a sugar, such as dextrose, sucrose, and fructose, and 0.002 to 1.05 parts of an inorganic adjunct selected from the group consisting of hydrochloric acid; sodium chloride; a mixture of paraformaldehyde and ammonium chloride; a mixture of paraformaldehyde and hydrochloric acid; and boric acid—but excluding a vegetable gum. Sufficient water is added to mill the mix, which is then baked at at least 177 deg. C.

807,319. Griffin Wheel Company, 445 North Sacramento Boulevard, Chicago, Cook, Ill., USA.

Foundry moulds, in particular those adapted for use with pressure-casting apparatus. (See also B.P. 721,065.) These are of the kind in which the molten metal is forced upwardly under pressure through a gate and thence into the bottom of the mould cavity. A stopper moves down to close the gate after the cavity has been filled with molten metal.

807,363. Eisenwerke Gelsenkirchen, A.G., Hohenzollernstrasse, 2 - 4, Gelsenkirchen, Germany.

An improved method for the casting of hollow metallic bodies having one closed end.

Lisbon Trade Fair

*A British Trade Fair will be held in Lisbon, Portugal, from May 28 to June 14. A number of the stands which will be of interest to foundrymen are reviewed in what follows.**

ENGLISH STEEL CORPORATION, LIMITED (*A.3*). The larger-size products, which include steel castings up to 185 tons, will be portrayed photographically, as will be the steel-making capacity, which includes ingots up to 300 tons. Actual exhibits on view will include smaller-size products such as engineers' cutting tools, permanent magnets, and (by Darlington Forge, Limited) model-ships' sternframes, port and starboard shaft brackets, and a Doxford crankshaft. The productive capacity of Firth-Vickers Stainless Steels, Limited, will be shown by precision castings, etc.

WILD-BARFIELD ELECTRIC FURNACES, LIMITED (*A.24*). The largest furnace on show will be a horizontal batch type (Model HW1610) having a chamber 30 in. long, with a door opening 16 by 10 in. Also on exhibition will be a selection of standard laboratory muffles, and a forced-air circulation furnace (Model TRT1010), having nominal workbasket dimensions of 10 in. (254 mm.) dia. by 10 in. deep.

GUEST, KEEN & NETTLEFOLDS GROUP OF COMPANIES (*E.141*). Exhibits will include outboard motors, handtools, railway buffers, induction-heaters and furnaces. The group's steel-making activities will be shown pictorially by means of transparencies.

BRITISH IRON AND STEEL FEDERATION (*A.1, A.4*), will exhibit a one-piece cast-steel bogie, as supplied to New Zealand Government Railways, and exhibited previously at the Brussels World Fair, 1958, where it was awarded a diploma of honour.

RANSOMES & RAPIER, LIMITED (*A.40, E.128A, E.129*). Exhibits will include the RapieR 4 standard mobile crane, and scale models and photographs of the company's range of fork trucks, walking draglines and concrete mixers, etc.

ENGLISH ELECTRIC COMPANY, LIMITED (*A.31*). An outstanding exhibit will be the Deriaz Wheel, a new reversible pump turbine which enables very effective use to be made of the pumped storage principle.

BRITISH INSULATED CALLENDER'S CABLES, LIMITED (*A.38*), will display some of the products of their cable factories, and will also illustrate their construction activities.

GUY MOTORS, LIMITED (*E.133*), will exhibit the Invincible Mk. II goods vehicle and a Warrior lightweight underfloor-engined passenger-chassis.

* The figures in the brackets after each firm's name indicate Stand No.

COMMENTING on the report that the United Nations zinc and lead committee had agreed that further cuts in world production of lead and zinc were necessary, Mr. McEwen, Australian acting Prime Minister, said that this should bring supply and demand for the metals into closer balance. The Australian lead and zinc industries had advised him that they would curtail supplies offered for sale in line with the decisions reached. He emphasized that the undertakings were voluntary arrangements by the industries themselves, and there was no question of formal Government control.

Personal

Mr. G. A. PLUMMER retires to-day from the board of John Thompson, Limited.

Dr. ROBERT T. PARKER has been appointed head of Aluminium Laboratories Limited Banbury and Geneva offices in succession to Mr. R. D. HAMER.

Mr. G. A. BAKER, who for more than 30 years has been secretary of Bowen & Company, Limited, brassfounders, Phoenix Foundry, Mount Pleasant, London, recently completed 60 years' service with the company.

Dr. G. H. JOWETT, of Sheffield University, who was formerly on the staff of the United Steel Companies, Limited, has been appointed associate director of the statistics laboratory in the Department of Statistics at the University of Melbourne.

Mr. C. W. CLARKE, has been appointed home sales manager of the Surform Division of Simmonds Aerocessories Limited, Treforest (a member of the Firth Cleveland Group) and will operate from Byron House, 7-9, St. James's Street, London, S.W.1.

Mr. W. K. MOORE, G.R.M.E., has been appointed manager of the newly-formed gas cleaning division of Steels Engineering Installations, Limited, Sunderland. This division has been formed to manufacture SPA dust-collecting equipment, for which Steels hold an exclusive licence in the UK.

Mr. C. B. BROCKBANK, who has represented the Staveley Iron & Chemical Company, Limited, Chesterfield, in north Wales for the past 31 years, has retired. Since 1939 he has worked from Colwyn Bay, but in future the north Wales area will be served by the company's office at Grosvenor Chambers, 16, Deansgate, Manchester.

Mr. ALBERT BULPITT, a director for 48 years of Bulpitt & Sons, Limited, Birmingham, retired on May 12 after 63 years' service with the company. To mark his retirement the senior staff entertained him at dinner and presented him with an engraved silver salver, while his fellow directors are presenting him with a portrait.

The third member of his family to hold such office, Mr. H. NORMAN G. ALLEN, joint managing director of W. H. Allen, Sons & Company, Limited, Bedford, has been elected vice-president of the Institution of Mechanical Engineers. Previous members of the family to become vice-presidents were his grandfather, the late Mr. W. H. Allen, in 1915, and his uncle, the late Sir Richard W. Allen, a past-president, in 1924.

Mr. G. R. PRYOR, who has been elected president of the Institution of Production Engineers for 1959-60, has been a member of its Council for 14 years and of the Finance and General Purposes Committee for 12 years. He is chairman and managing director of Edward Pryor & Son, Limited, steel marking device engineers, of Sheffield. Mr. Pryor is a member of the Council and executive committee of the Production Engineering Research Association of Great Britain.

The EARL OF HALSBURY, F.R.I.C., F.INST.P., has been appointed to the board of Lancashire Dynamo Electronic Products, Limited, as chairman. Lord Halsbury is vice-chairman of Lancashire Dynamo Holdings, Limited, and also has a number of other board appointments with major industrial organizations. He was until recently managing director of the National Research Development Corporation, a position he had held since the Corporation was set up in 1949.

Mr. CARL BECKER, senior technical officer of the Morgan Crucible Company (Aust.) Pty., Limited, and a Council member of the Institute of Australian Foundrymen, is on an extended tour overseas. Mr. Becker proposes to spend some time in the USA, UK, and the Far East, including Malaya, Thailand and possibly the Philippines. While in the United Kingdom, Mr. Becker will visit the parent company and associates, and will attend the IBF Conference in Scarborough.

Mr. R. J. JACKSON NISBET, director of Canadian operations for Wolf Electric Tools, Limited, London, W.5, is expected to arrive in this country on May 27 for a four-weeks' business visit. The Canadian branch recently moved into new and larger premises at 93, Advance Road, Toronto, and during his stay Mr. Nisbet will discuss at the London head office plans for further development of the company's Canadian interests.

Seven long-service employees of Russell's Brassfoundry, Limited, Motherwell, were last week presented with gold watches, amongst them being Mr. THOMAS WRIGHT, managing director, with 43 years' service, and Mr. ROBERT WRIGHT, foundry manager (41 years' service). The other recipients were Mr. JAMES WALLACE (48 years), Mr. GEORGE BROWN (47 years), Mr. ALEX. CLELLAND (43 years), Mr. JAMES WILSON (32 years), and Mr. ALEX. RICHARDSON (26 years). Mr. J. W. Waudby, managing director of British Steam Specialities, Limited, Leicester, who became associated with Russell's Brassfoundry, Limited, a year ago, presented the gifts.

Mr. HUGH PATON MILLAR, foundry manager at the Holwell (Leics) works of the Stanton Ironworks Company, Limited, is leaving to take up an executive position with Federated Foundries, Limited, at Thornaby-on-Tees. He went to Holwell as acting foundry manager in 1945, at the age of 24, and he was later foundry manager at Erriwash; returning to Holwell as foundry manager in 1949. He is a past-president of the East Midlands branch of the Institute of British Foundrymen and one of the youngest foundry managers in the country.

Mr. W. EDGAR HALE has tendered his resignation as chairman and director of Hale & Hale (Tipton), Limited, due to ill-health. The board has nominated him president of the company subject to confirmation by the shareholders at the next annual meeting. Mr. R. C. LEPPINGTON has relinquished his position as vice-chairman and managing director of the company and its subsidiaries and has been appointed their chairman. Mr. J. A. WYLDE has been appointed managing director of Hale & Hale (Tipton), and Mr. WILLIAM CLARKSON, vice-chairman of that company and its subsidiaries. Mr. FRANK COE has been appointed managing director of the subsidiary companies while retaining the posts of director and secretary.

At the annual general meeting of the Electrical Development Association on May 12, Sir JOSIAH ECCLES, C.B.E., M.M., D.SC., deputy chairman of the electricity Council, was appointed president of the Association for the year 1959-60. Mr. A. W. FERGUSON, former chief administrative officer, Electricity Board for Northern Ireland, and Mr. JOHN MOULD, O.B.E., former chairman, East Midlands Electricity Board, were appointed vice-presidents for the term 1959-1962. At the first meeting of the Association's newly-constituted Council, Mr. T. E. DANIEL, chairman of the North Western Electricity Board, was elected chairman for the year 1959-60, and Mr. D. B. IRVING, B.SC. (ENG.), chairman of the London Electricity Board, was elected vice-chairman.

News in Brief

WEST GERMAN machine-tool production reached a total value of about £153,000,000 in 1958—3 per cent. less than the 1957 figure. Exports rose by about 7 per cent., Britain being the second biggest buyer.

THE INDONESIAN GOVERNMENT has decided that the import of certain commodities is to come under a Government monopoly. These commodities include tinplate and iron, as well as imported raw materials and capital goods for industries.

LARGEST SINGLE SHIPMENT of BTD-20 crawler tractors was made last month from the Doncaster works of the International Harvester Company of Great Britain, Limited, when six were despatched. IH has now built 100 BTD-20 tractors since production began last September.

AN AIR MINISTRY contract worth approximately £300,000 for the supply of Paxman 410 kw diesel generating sets has been received by Ruston & Hornsby, Limited, Lincoln. The electrical generators are being built by the associate company, Davey, Paxman & Company, Limited, Colchester.

HEADED BY THE AUSTRALIAN HIGH COMMISSIONER, Mr. A. R. Tayson, a delegation from Australia began a tour of Midland industry on May 11. Civic heads and leaders of industry from Birmingham and the Black Country met members of the party at a reception in Birmingham on that date.

HATTERSLEY BROTHERS, LIMITED, Queens Foundry, Swinton, Mexborough, Yorks, will be participating in the Northern Industrial Efficiency Exhibition, to be held at Woodhouse Moor, Exhibition Site, Leeds, from June 3 to 12. Exhibits of the company will include Vertex, Vesta and Vulcan gas-fired boilers.

MACHINE TOOLS from 14 countries are on show in Sydney, Australia, at an exhibition of machinery claimed to be the largest in the southern hemisphere, and officially opened on May 11 by Sir Eric Woodward, Governor of New South Wales. The exhibition is the second to be organized by the Sydney Chamber of Commerce.

THE NORTHERN SECTION of the Institute of Vitreous Enamellers is to-day holding a meeting at the Old Nag's Head, Jacksons Row, Deansgate, Manchester, commencing 7.30 p.m. The lecturers will be Mr. K. A. Maskall and Mr. J. Gaiger who will speak on "Problems Associated with Direct Application of Self-mottle Finish."

FIRTH CLEVELAND FINANCE, LIMITED, announces the opening of a branch office at Corn Exchange Buildings, 19, Hanging Ditch, Manchester 4 (Telephone: Deansgate 5253/4). The manager is Mr. E. Hibbs. In London, Mr. A. H. Waller has been appointed branch manager of the company's office at County House, 45, East Hill, London, S.W.18.

OVERSEAS EXECUTIVES of the Cementation group of companies who are in Britain for a conference and tour, arrived in Sheffield on May 11 and visited the Cementation plant in Doncaster the following day. The party included Mr. A. R. Neelands, the chairman, and Mr. C. F. Grundy, managing director of the Cementation Company, Limited.

A CONTRACT VALUED at over £1,000,000 has been signed by the U.D. Engineering Company, Limited, London, N.W.10, with V/O Techmashimport, Moscow, for the supply of large-capacity refrigeration plants. The compressors will be manufactured by James Howden & Company, Limited, and Crompton Parkinson, Limited, will be responsible for the engineering and manufacture of the electrical plant.

THE ROLE of resuscitation equipment in saving lives—in industry, recreation and in the home—is revealed in a 20-minute colour film "Fetch the Minuteman" which was previewed in London last week. Produced for the Medical Division of British Oxygen Gases, Limited, by their film unit at Cricklewood, the film shows a variety of emergency applications in which the Stephenson "Minuteman" resuscitator can save lives.

THE INSTITUTE OF AUSTRALIAN FOUNDRYMEN held its annual general meeting in March. An election of officers took place with the result that Mr. J. Waterman was elected president; Mr. J. Prentice and Mr. J. Hunt, vice-presidents; and Mr. L. Slater, treasurer. Members elected to serve on the Council of the Institute were Mr. A. Ulmer; Mr. C. Becker; Mr. B. Caddow; Mr. W. Petersen; Mr. Forbes Smith and Mr. F. Weierter.

A FALL OF 29 PER CENT. in Tyne imports during the first three months of this year compared with last year was entirely due to a drop in iron-ore imports. Total imports were down from 683,014 tons to 485,302 tons; iron-ore imports dropped from 270,309 tons to 39,235 tons. Coal and coke shipments from the river for the four months to April 30 totalled 2,062,448 tons, a fall of 321,837 tons, compared with the corresponding period of last year.

RUSTON & HORNSBY, LIMITED, Lincoln, have secured, in face of keen competition, an order to supply a mobile power-station for Russia. The plant, which is mounted on a specially constructed railway wagon, will be used for semi-isolated civil construction sites and small townships temporarily cut off by severe weather. The Ruston 1,000-kw. gas turbine powering the plant is reported to be the first British industrial gas turbine to be exported to the USSR.

COVENTRY'S NEW HERBERT ART GALLERY AND MUSEUM has acquired the oldest Standard car known to be in existence. The six-cylinder tourer, made in 1906, was ceremoniously driven to the museum on May 10 by Mr. Alick S. Dick, managing director of the Standard Motor Company, Limited, his passengers being the Lord Mayor and Lady Mayoress of Coventry. The car which had been exported in May, 1907, was found two years ago in an outhouse on an Australian tobacco farm.

MR. CHARLES H. CRABTREE, chairman of R. W. Crabtree & Sons, Limited, printing machinery manufacturers, Leeds, has stated that the firm has received considerable encouragement in their initial exploration of the market in the more difficult territory of the Western Hemisphere. Several orders for large offset-printing machines have been received. Several large orders have also recently been received from Kemsley Newspapers for machines for their various offices, and confirmation of an order for a large machine for their new building has just been received from Daily Mirror Newspapers, Limited.

AN EXTENSIVE modernization scheme costing £1,200,000 is in the final stages of completion at the shipyard of William Denny & Bros., Limited, Dumbarton, Scotland. It has involved reducing the number

News in Brief

of building berths from seven to four, and erecting a new platers' shop and steel stockyard and a new fabrication shed capable of handling prefabricated sections up to about 45 tons. As economic conditions permit further stages of modernization will be carried out at a cost of another £500,000.

HOLLAND'S MAJOR iron and steel works, Koninklijke Nederlandsche Hoogovens en Staalfabrieken, has increased production from 222,129 tons of pig-iron and 97,967 tons of raw steel in 1946-47 to 917,210 tons of pig-iron and 1,119,151 tons of raw steel last year. The estimated output for the current year is 1,050,000 tons and 1,300,000 tons, respectively, and for 1960, 1,200,000 tons and 1,350,000 tons, respectively. Thick plates, not produced at all in 1946-47, are now being turned out at a rate of 311,178 tons a year.

MORGAN CRUCIBLE COMPANY, LIMITED, Battersea Church Road, London, S.W.11, will be participating in the National Education and Careers Exhibition, to be held at Olympia, London, from May 26 to June 5. The field in which the company's products are now used covers the aircraft, automobile, engineering, iron and steel, nuclear power, radio and textile industries, and the display will give some idea of the way in which Morgan products affect the everyday life of the public, and to the opportunity existing within this organization for a worthwhile and satisfying career.

SIR WILLIS JACKSON, director of research and education at Metropolitan-Vickers Electrical Company, Limited, received the honorary degree of Doctor of Engineering of Sheffield University on May 12. Dr. Ronald Holroyd, deputy chairman of ICI, received the honorary degree of Doctor of Science. At a luncheon before the ceremony, Sir Willis said that one of the most important educational needs to-day was the growth of a closer partnership between the universities and industry, and that it was becoming more important to establish good channels of communication between the increasingly large numbers of specialized fields in knowledge. "Unless a man has had a broad education and is a good non-specialist, he is unlikely to develop into a first-class specialist. The universities carry a very heavy responsibility to the community in this regard," he added.

A DETAILED FACT-FINDING SURVEY in relation to the early establishment of an iron and steel industry in New Zealand has been completed by Mr. John Miles and Mr. T. Bishop of John Miles & Partners (London), Limited, consulting engineers, acting on behalf of Stewarts & Lloyds, Limited, Glasgow, and Colvilles, Limited, also of Glasgow. The latter companies, together with Fletcher Holdings, Limited, and Industrial Metals, Limited, are interested in sharing in a project involving the construction of a steel works for Pacific Steel, Limited, at Otahuhu, New Zealand, which is expected to produce about 50,000 tons of steel annually from local scrap. The Government have approved in principle the scheme which Pacific Steel has put forward, but no such approval has been given yet to any group or company to proceed with an integrated iron and steel plant based on using local iron sands, fuel and power. John Miles & Partners has stated that whilst this larger scheme would probably eventually come to fruition, more detailed work would be needed on iron sands to determine the most profitable technical and economic process to be used for their smelting. Once this was decided, the most suitable site could be chosen in the best interests of the national economy.

Obituary

Mr. JOHN MAIR, London manager of Glenfield & Kennedy, Limited, valve manufacturers and hydraulic engineers, of Kilmarnock, has died at the age of 63. He started his apprenticeship with the firm in 1912. In 1923 he joined the Glenfield organization in India and became its chief engineer.

The death has occurred of Mr. WILLIAM BECK BAXTER, a former director of the United Steel Companies, Limited, at the age of 72. He retired from the board and also from the position of joint managing director of the Appleby-Frodingham Steel Company, Limited, in June, 1951. For many years Mr. Baxter was a member of the Council and a vice-president of the Iron and Steel Institute, he had also served as chairman of the Plant Engineering Division of the British Iron and Steel Research Association and of the Lincolnshire Ironmasters' Federation.

Sir LEONARD BROWETT, director of the National Union of Manufacturers from 1945 to 1953, died on May 7. He was 74. Formerly a distinguished Civil Servant, he built up the National Union of Manufacturers from an organization of 1,800 individual members and some affiliated trade associations to one of considerable power and prestige with 5,500 members, nearly 80 affiliated trade associations, and area committees in many towns and cities. Since 1953 he had been a director of the Industrial & Commercial Finance Corporation, Limited, and he was also a director of Super Oil Seals & Gaskets, Limited.

An American who brought a new industry to Sheffield—Mr. WILLIAM HULSE MILLSPAUGH—has died at the age of 90. His name is perpetuated in Millspaugh, Limited, makers of non-ferrous centrifugal castings and papermaking machinery, now a member of the Hadfields, Limited, group. After spending much of his working life organizing the Sandusky Foundry & Machine Company, Ohio, the first company to produce on a commercial basis large centrifugally cast bronze shells, Mr. Millspaugh came to Sheffield in 1933 and arranged with the late Sir Robert Hadfield to lease a site in the East Hecla Works of Hadfields, Limited. There he set up a centrifugal foundry to continue his development of centrifugal castings in bronze and steel, and also of suction rolls. When, in 1946, Mr. Millspaugh, who was 77, decided to return to Sandusky where he died, the company was taken over by Hadfields.

Sir ARCHIBALD BOYD, managing director and, since 1955, chairman of the Metropolitan-Cammell Carriage & Wagon Company, Limited, has died at the age of 70. Sir Archibald, who was knighted in 1950, went to work for Cammell Laird & Company, Limited, in Sheffield after leaving the university and in 1921 became the company's London manager. He was appointed managing director of the Metropolitan Cammell Carriage & Wagon Company in 1934, and became chairman on the retirement of Lt.-Col. J. B. Neilson at the age of 70. Sir Archibald was also chairman of the Patent Shaft & Axletree Company, Limited, and a director of a number of other companies including Associated Electrical Industries, Limited, Bus Bodies (S.A.), Limited, and Cammell Laird & Company, Limited. During the last war he served for just over 12 months as Director-General of Tank Production in the Ministry of Supply and he was appointed a member of the President of the Board of Trade's Overseas Trade Development Council which was set up in 1945.

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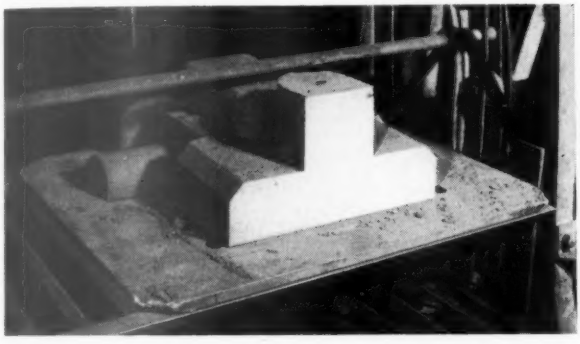

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Raw Material Markets

Iron and Steel

Pig-iron supplies remain plentiful, current production, coupled with the stocks on hand at the furnaces, being more than adequate for consumption requirements. Blast-furnace outputs continue at much below capacity levels; based on present demands, additional tonnages are not warranted. Major production is confined to basic pig-iron for the steelworks, and this consists of about 80 per cent. of total outputs. With the more favourable conditions in the steel trade, coupled with rising outputs, the usage of raw materials is increasing and this should eventually lead to bigger demands for pig-iron. With plentiful supplies of scrap available, the steelworks are able to use a larger percentage in their mixtures, and the call for pig-iron has, in consequence, not shown a proportionate increase. For the present, good stocks of basic iron are on hand at the steelworks and the furnaces, and production is more than sufficient.

The foundries are also able to obtain all the pig-iron they need without difficulty, and producers would like to see an appreciable increase on present demands. The low-phosphorus irons continue to be taken up freely, with demands tending to increase, particularly from the foundries supplying castings to the motor vehicle industry. The machine-tool trade remains comparatively quiet and this is affecting similarly the foundries connected with them. Overall, however, the engineering foundries are continuing the most favourably employed, and most of them are obtaining fairly good outputs of castings. The call for hematite and refined irons shows little improvement, and producers could take on much more business.

The slightly increased demand for high-phosphorus iron is maintained, with some of the light foundries better employed, but much more work is required to bring these foundries up to capacity outputs. The jobbing and textile foundries are also in need of more work.

The improved demand for steel semis continues, and some of the re-rollers are able to show better outputs. There has been a slightly improved demand for their products, including small bars and light sections, and the call for reinforcing rods is fairly good. A much larger volume of work, however, is needed by the re-rollers, as many mills are still working short time. Home steelworks are able to fulfil present demands for billets, etc., without difficulty, and could easily increase these tonnages.

Non-ferrous Metals

Taking into account the Whitsun holidays, non-ferrous metal markets in London experienced reasonably good trading conditions last week. Copper was a mixed market. Sentiment improved on the reassurances from the authorities that the US Government had no intention to dump stockpiled copper on the market, but became uneasy on the disappointing figures released by the United States Copper Institute, which showed a rise in world copper stocks. Meanwhile the US futures market continued to plough its unsteady course. One of the reasons given for the dull market in London is the absence of any buying of rod and wire from the Soviet Union, which was in evidence this time last year. However, hopes are that once the Soviet has fulfilled its purchases of rubber that they will then turn to copper.

In the US copper is still being taken off the market at a good steady rate. The price structure has remained unchanged, with custom smelters quoting 32 cents and producers 31½ cents a pound. Yet, reports from custom smelters tell that they have little to offer owing to the poor offerings of scrap at the present price. This may well lead to an early rise in the custom smelters' price.

Tin has succeeded in going better both in London and in New York, where steady consumer buying has lifted the price above $1.03 a pound. Next month the International Tin Council meets in Copenhagen and it is thought that the export quotas for the producing countries will be raised further. Meanwhile, stocks have come down satisfactorily.

At the end of last week the meeting in New York of the Lead and Zinc Committee of UNESCO issued a communiqué from which it was deducible that the participating producer nations did not wish to have further Government interference. And in order to effect this attitude, a number of private agreements were made to cut back production of the two metals. Production cutbacks for lead metal for the second half of 1959 will reduce the supply by about 45,500 *tonnes*, while those relating to zinc will decrease its supply to the market by about 52,000 *tonnes* during the same period. Even so, the outlook for lead is still bleak, although the US price of 12 cents a pound is holding up well.

Zinc is a better market than lead and the price in London has edged higher. In fact, activity at times has been brisk and much of the interest has been concentrated on nearby metal. In the US zinc is a fair market and the Canadian decision to increase the price by ½ cent a pound may well be followed shortly in New York. Meanwhile, the East St. Louis spot price is still called 11 cents a pound.

New Catalogues

Idlers and Sectional Belt Conveyors. In Booklet 703, Mavor and Coulson, Limited, Bridgeton, Glasgow, S.E., deal very extensively with those important components in mechanical-handling systems, idlers and sectional belt conveyors. The booklet covers the lubrication of the idlers, and the layout and use of both three-and five-roller idler assemblies. Most of the illustrations used deal with mining applications, the uses of which in mechanized foundries suggest themselves. Full data are given as to dimensions of the various components.

Power-transmission Components. Crofts (Engineers), Limited, Thornbury, Bradford 3, have issued nine catalogues and leaflets dealing with such subjects as combined spur- and worm- double-reduction-geared motors (No. 658): flexible and resilient couplings (No. 5916); fabricated-steel pulleys (No. 858); worm-geared motors (5914); magnetic clutches and brakes No. 5923; and multispeed-geared motors and reduction gears No. 5921. A useful series to have in any buyer's office.

Handling Equipment. G. Hunter (London), Limited, 80, Fenchurch Street, London, E.C.3, have issued a 174-page illustrated catalogue covering cranes, hoists, lifting tackle, jacks, conveyors, stackers, fork trucks, pallets and stillages. Photolitho printing has been used, which seems to have resulted in a variable quality of the illustrations. Some show real clarity, whilst others are indistinct. Purchasing agents will find the catalogue extremely useful, as quite a number of the items listed can be supplied "off the shelf." An interesting foundry application of Mansaver grabs is shown in Fig. 6, page 1 of the section devoted to this subject.

Baker Perkins Foundry Machinery at work.....

at R. & A. Main Ltd.

R. & A. Main Ltd. use this 'Medium' Rotary Table Shot Blast Machine for a wide range of application at a high production rate. The special control desk includes signal lights, 24 volt current socket for inspection and ammeters indicating the shot output of the patented bi-phase impellers. The wiring circuit is arranged for automatic operation to cut out human errors.

Please write for further details to:

Baker Perkins Ltd *Foundry Machinery Division*

Bedewell Works · Hebburn on Tyne · England *Tel: Jarrow 897124* BP/F2

HISTORICAL NOTE

R. & A. Main Ltd. were established in Glasgow in the 1870's. Following the amalgamation with Thomas Glover & Co. Ltd. in 1897, extensive sites were acquired at Edmonton and Falkirk. They produce a wide range of domestic appliances including the 'Century' gas cooker, the 'Century' gas heater and the Main No. 36.c. Refrigerator — the first to carry a ten year guarantee.

Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

May 20, 1959

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £23 17s. 0d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £24 1s. 3d.

Scotch Iron.—No. 3 foundry, £25 3s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 19s. 0d.; South Zone, £26 1s. 6d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £27 6s. 6d.; South Zone, £27 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent.: N.-E. of England (local iron), £25 6s. 6d.; Scotland (Scotch iron), Zone S.1, £25 13s. 0d.; Sheffield, £26 15s. 0d.; Birmingham, £27 4s. 0d.; Wales (Welsh iron), £25 6s. 6d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leics.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £41 0s. 0d. to £43 10s. 0d., scale 15s. 0d. per unit; 75 per cent. Si, £56 10s. 0d. to £60 10s. 0d., scale 15s. 0d. to 16s. 0d. per unit.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 8s. 5d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 11s. 5d. per lb. of W.

Ferro-chrome (6-ton lots and over).—4/6 per cent. C, £77 0s. 0d. to £81 0s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; over 6 per cent. C, £74 10s. 0d. to £77 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; 2 per cent, C,* 1s. 7½d. to 1s. 10½d. per lb. Cr; 1 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 0.15 per cent. C,* 1s. 9d. to 2s. 0d. per lb. Cr; 0.10 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.06 per cent. C,* 1s. 9¾d. to 2s. 0¼d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £245 0s. 0d.; 96/98 per cent., £275 0s. 0d.

Ferro-columbium.—65/72 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (standard).—78 per cent., £69 10s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t.s. £32 15s. 6d.; tested, 0.08 to 0.33 per cent. C, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), £34 17s. 0d.; silico-manganese, £43 16s. 6d.; free-cutting, £36 14s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft up to 0.33 per cent. C, £38 10s. 0d.; basic hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E. Coast), £44 12s. 0d.; floor plates (N.-E. Coast), £43 11s. 0d.; angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. Coast), £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £40 0s. 6d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, £39 0s. 0d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., £44 16s. 0d.; black sheets (hand mill), 24g., £58 14s. 6d.; galvanized corrugated sheets, 24g., £67 10s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £68 10s. 0d.; nickel-chrome, £99 11s. 0d.; nickel-chrome-molybdenum, £111 19s. 0d.

NON-FERROUS METALS

Copper.—Cash, £237 0s. 0d. to £237 10s. 0d.; three months, £238 0s. 0d. to £238 5s. 0d.; settlement, £237 10s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 3½d. per lb.; rods, 246s. 6d. per cwt. basis; 20 s.w.g., 281s. 6d. per cwt.

Tin.—Cash, £784 0s. 0d. to £784 10s. 0d.; three months, £784 10s. 0d. to £785 0s. 0d.; settlement, £784 10s. 0d.

Lead (Refined Pig).—Second half May, £71 5s. 0d. to £71 7s. 6d.; second half August, £72 0s. 0d. to £72 2s. 6d.

Zinc.—Second half May, £78 0s. 0d. to £78 5s. 0d.; second half August, £76 0s. 0d. to £76 5s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £113 5s. 0d.; rolled zinc (boiler plates), all English destinations, £100 0s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £95 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 10½d. per lb.; sheets to 10 w.g., 197s. 3d. per cwt.; wire, 2s. 7¾d.; rolled metal, 197s. 3d. per cwt.

Brass (Brazing).—BS1400, B3 (65/35), £155; B6 (85/15), £196.

Brass (High Tensile).—BS1400, HTB1 (30 tons), £192; HTB2 (38 tons), £207; HTB3 (48 tons), £215.

Gunmetal.—BS1400, LG2 (85/5/5/5), £193; LG3 (86/7/5/2), £204; G1 (88/10/2/½), £256; (88/10/2/1), £242.

Phosphor Bronze.—BS1400, PB1 (AID released), £286 per ton.

Leaded Phosphor Bronze.—BS1400, LPB1 (1060), £275 per ton.

Phosphor Bronze Strip, etc.—Strip, 287s. 6d. per cwt.; wire, 4s. 0½d. per lb.; rods, 3s. 3¾d.; tubes, 3s. 3¾d.; chill cast bars: solids 3s. 3½d.; cored 3s. 4½d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 9¾d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 2¾d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 1¾d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 3d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £77 10s. 0d. Nickel, £600 0s. 0d. Aluminium, ingots, £180 0s. 0d.; aluminium bronze (BS1400), AB1, —; AB2, £190.

* Average 68-70 per cent.